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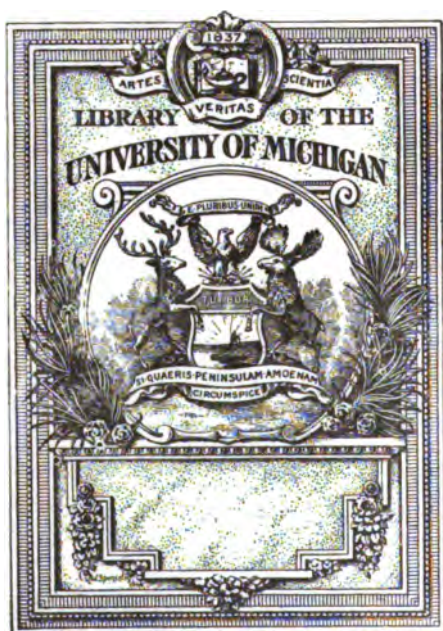
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INTERNATIONAL CLINICS:

A QUARTERLY OF CLINICAL LECTURES

ON

MEDICINE, NEUROLOGY, SURGERY, GYNÆCOLOGY,
OBSTETRICS, OPHTHALMOLOGY,
LARYNGOLOGY, PHARYNGOLOGY, RHINOLOGY,
OTOLOGY, AND DERMATOLOGY,

AND SPECIALLY PREPARED ARTICLES ON TREATMENT.

BY PROFESSORS AND LECTURERS IN THE LEADING
MEDICAL COLLEGES OF THE UNITED STATES,
GERMANY, AUSTRIA, FRANCE, GREAT
BRITAIN, AND CANADA.

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VOLUME IV. SEVENTH SERIES. 1898.

PHILADELPHIA:

J. B. LIPPINCOTT COMPANY.

1898.

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Drugs and Remedial Agents.

A NEW DEPARTURE IN THERAPEUTICS.

BY ROBERTS BARTHOLOW, M.D., LL.D.,

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Jefferson Medical College of Philadelphia, etc.

By the phrase "a new departure" it is not intended to signify a new method, to announce a discovery, or to enunciate a principle, but rather to propose a change of base. For reasons to be set forth presently it is suggested that *sodium* be substituted for *potassium* in certain compounds, especially in the *iodides* and *bromides*. Hitherto it has been the usual practice in prescribing an iodide or bromide to name the potassium base,—*e.g.*, potassii iodidum, instead of sodii iodidum, or ammonii iodidum, or calcii iodidum. It is true some attempts have been made, notably by our French *confrères*,—Vulpian, Germain Sée, Heuchard, and others,—to popularize the use of sodium iodide, especially in certain lines of treatment, nevertheless the potassium salt continues to be the favorite. I purpose to show that there are chemical, physiological, and therapeutical reasons why the sodium iodide should be prescribed in most instances instead of the potassium iodide. I shall further demonstrate that results can be achieved by the sodium iodide not at all attainable by the potassium iodide.

From the chemical stand-point I note that sodium iodide is soluble in greater proportion in water and in alcohol. Thus, it dissolves in six-tenths part of water and three parts of alcohol; whereas potassium iodide requires for solution one-seventy-five-hundredth part of water and eighteen parts of alcohol.¹ It follows from this that the sodium salt is the more diffusible, and as it is more soluble in alcohol, can be prescribed more freely in alcoholic solutions, or in mixtures containing alcohol. As the intestinal juices, the bile and the blood, owe their alkalinity to salts of sodium, it is obvious

¹ The Pharmacopœia of the United States, decennial revision, 1890.

that medicaments deriving their powers from the same source will act more in harmony with these secretions than if combined with the potassium base.

Studied from the physiological stand-point, the superiority of the sodium base over the potassium base is still more clear. The potash salts are more irritating to the mucous membrane. Illustrating this point by a comparison of the iodides, we find that while sodium iodide may be administered in the most irritable states of the stomach, and, as I shall presently state, is a remedy of great value in stomachal catarrhs, potassium iodide is, on the other hand, in a high degree irritating in itself, and the cause of increased irritation when given in morbid states of the organ. In maladies of the portal circuit, from the physiological stand-point, when an alkali is indicated, it must be a sodium salt that is prescribed, since the alkalinity of the bile is caused and maintained by the base sodium in combination with the bile acids.

A profound difference exists in the toxic effects of potassium and sodium in the system at large. While potassium is a poison to the anatomical elements of the system, sodium is not only free from toxicity, but it is without any really injurious effect. Although this fact may imply some limitation of therapeutical activity, this is scarcely equivalent to the absence of toxic power. Potassium administered in large quantity for some time seriously affects the integrity of the tissues. It promotes oxidation and increases the retrograde metamorphosis. It causes wasting of the solids, and renders the blood more watery. The more highly specialized the tissue, the more rapidly it yields to the destructive influence, and this is true of the various kinds of animals, for, as Dr. Paul Guttman originally demonstrated, its toxic effects are manifested on all forms of animals. This is also true of its effects on the brain, the spinal cord, and peripheral nerves. It is a paralyzer, the action expended on the centre, and the peripheral nerves and muscles are affected secondarily. It is a paralyzer of the central organ of the circulation through an impression made on the vasomotor centre in the medulla, and it acts by direct contact with the heart-muscle, destroying its contractility. This important fact was first demonstrated by Traube and Guttman, and more recently by Ringer and Murrell. It has, therefore, in a high degree, the power to depress and paralyze the circulatory system. When, therefore, atheromatous changes begin in the valves and arteries, the exhibition of the

potassium salts may be expected to increase the changes in all directions, at the same time lessening the power to functionate.

It is surely unnecessary to enlarge further on the destructive changes wrought by potassium on the tissues, and in the more highly specialized in greater ratio. That sodium does not have these effects is admitted on all sides. We have, however, to ascertain whether as a base to form salts or binary compounds it results in inferior combinations as compared with potassium. When the purpose is to effect tissue metamorphosis, as, for example, in inflammatory affections, or to reduce temperature, or to increase renal excretion, the combinations of potassium with vegetable and mineral acids are more effective than the corresponding salts of sodium. In those important binary compounds resulting from the union of iodine and bromine with the bases, and in such salts as the permanganate of potassium, it is not the base but the combining agent that is active and curative. In the combinations with vegetable acids, on the other hand, it is the alkaline base that confers on the salt its therapeutical powers. It follows from these considerations that as potassium has so irritant an action on the nervous and muscular systems in the binary compounds formed with it, more or less hinderance may thereby be exerted in the curative range, and hence on *a priori* considerations the compounds with sodium should be preferred.

Experimental and clinical evidence goes to confirm this view. The rate at which they diffuse to develop characteristic symptoms must be taken into consideration. From the chemical stand-point it would appear that the iodide of sodium is somewhat more diffusible, but having less power to promote excretion by the kidneys is longer retained in the system. If these data be correct, iodism should be more readily induced by sodium iodide. In some comparative observations on this point I have ascertained that iodism occurred more quickly with the sodium salt, but when caused by the potassium salt was accompanied by more general irritative lesions.

In regard to their comparative action on the nervous systems of animal and organic life, those compared being the bromides of sodium, potassium, calcium, ammonium, and lithium,¹ I ascertained that the sodium salt was the most efficient as a hypnotic and as a moderator of reflex actions. In frogs especially, but also in warm-blooded animals, sodium bromide surpassed all the other bromides

¹ Fisk Fund Prize Essay of the Rhode Island Medical Society,—“On the Bromides.”

in its hypnotic effects, and as a sedative to lessen reflex activity of the medulla. I do not mean that any dose of sodium bromide will surpass all the other bromides in effect, but that an equal quantity of sodium bromide possesses more power to allay cerebral excitement, to promote sleep, and to lessen the reflexes, and as it can be given in far larger doses within the limits of safety, the actual amount of effect can be far greater.

The clinical aspects of this question show still more conspicuously the superiority of the sodium iodide or bromide. I have first to note that these agents are usually well borne in the most irritable, even inflamed states of the gastro-intestinal mucous membrane. In fact, for gastric catarrh, with its acidity, pyrosis, gaseous eructations, epigastric pain, etc., hardly any remedy is so efficient as sodium iodide. Recently Professor Thomas R. Fraser, of Edinburgh, has brought forward potassium bichromate as a remedy in gastric catarrh of various degrees of severity, and he reports many cases illustrating its utility. In my experience in the same class of cases the iodide and bromide of sodium—one or both—act more efficiently. I assume that the cases are of the following kind: there are epigastric pain and soreness to pressure, sometimes acute pain extending through to the spine, nausea, occasional vomiting, a heavily furred tongue, fetid breath, eructations of gas, sometimes explosive in character, anorexia, wasting, irritable heart, now slowly acting now rapid, with low tension, headache, hemicrania, obstinate constipation. In such examples the effects of sodium iodide—fifteen grains to one scruple *ter in die*—are little short of marvellous. In a few days the symptoms subside, and in a few weeks recovery ensues in the more recent and uncomplicated cases. Chronic gastric catarrh, pain after eating, vomiting of mucus, of the acid products of acetic and butyric fermentations, vomiting at certain intervals after meals, etc., in the writer's experience there are no remedies so effective as the combined salts of iodide and bromide of sodium, and arsenate of sodium.¹ Of course the less severe the lesions the greater the certainty not only of relief but of cure. I do not enter into the various pathological questions, or into the therapeutical

¹ R. Sodii iodid.,
Sodii bromid., aa ℥ss;
Sodii arsenat., gr. i;
Aquæ destil., f℥iv. M.

Sig.—A teaspoonful in some water three times a day.

needs developed by a chemical and physiological examination (trial breakfast, normal, excessive, or deficient acidity, presence of lactic, butyric, and other pathological acids, etc.), but given the ordinary chronic gastric catarrh with its multitudinous symptoms, no other means of relief will be as generally successful. I affirm that still more decidedly when there is obstructive difficulty at the pylorus caused by a scirrhus developing within, or by pressure from without, inducing narrowing. The reader will perceive that I do not enter into the consideration of lavage, or of gavage, or of the chemical products of the fermentations going on in the stomach contents. Nor do I compare the results of such modes of treatment with my own. I content myself with a single observation. As respects lavage, when there is dilatation, muscular paresis, or immobility, and narrowing of the pylorus, is it not to be feared that the stomach-tube and the reservoir form a hydraulic press which, when in action, must greatly distend the stomach, and by over-distention increase the weakness (paresis) of the muscular wall.

Probably in no maladies is the action of sodium iodide more conspicuous for good than in certain diseases of the circulatory system. When atheroma of the vessels, and of the cardiac valves and orifices, and consequent incompetence, aneurismal dilatations, and pouches of the aorta, due to the same cause, are present, sodium iodide is indicated. It is altogether remarkable, in view of the conclusions arrived at by our French colleagues, which are now supported by the most conclusive testimony, that digitalis should continue to be so much employed in these affections.

The differential application of these remedies may be stated as follows:

Whenever the arterial tension is high, especially when this condition is due to "rigid arteries," digitalis is always hurtful, often dangerous.

Whenever the cardiac lesions are obstructive in character, digitalis is contraindicated.

When on these grounds digitalis and its congeners should be rejected, not only is sodium iodide safer, but it is far more beneficial. Within certain limits it is curative even when digitalis is dangerous.¹

¹ A case narrated by Professor Böhm, of Dorpat, is highly instructive in this connection. A young woman who had received a single toxic dose of digitalis died on the fifth day on getting out of bed, when all the effects of the poison had ceased for several days.

I would not be understood, however, as denying the utility of digitalis when, with low tension of the vessels, there is general oedema. It is especially in cases of atheroma, of obstructive aortic lesions, of fatty degeneration (initial), and of mitral lesions secondary to atheroma or inflammatory changes of the aortic orifice, that such remarkable improvement takes place under the use of the iodides. I could give many illustrations if a recital of cases was a part of my purpose.

It is well known, of course, that the iodides are remarkably beneficial in aneurism. There are differences of opinion as to its manner of action, but its curative power is generally admitted. It probably promotes the coagulation of the blood in the aneurismal sac and the contraction of the walls on the cavity; but the chief action is doubtless on the specific element in the case, the poison of syphilis inducing the chronic arteritis, which is the initial lesion.

In the various nervous affections for which the bromides have been so much prescribed, hitherto the potassium base has been almost wholly employed. From the physiological stand-point the sodium base should be preferred, for, as I have shown, the hypnotic and sedative effects of sodium bromide are better and the irritant and depressive effects are far less. It is in epilepsy the more necessary to prescribe sodium bromide, because in this disease the remedy must be continued for a long time. The rule established by Voison is, on the whole, a useful guide,—to administer the bromide in such quantity and frequency as to allay the reflex contractions of the fauces. The proof that such a state has been brought about by the remedy is afforded by the fact that when a spoon-handle is brought against the base of the tongue and pillars of the throat no movement occurs. What is true of epilepsy is equally true of other affections of the brain and nerves. When the objects are to remove irritation, to allay reflex excitability, and to promote sleep, they are better accomplished by the sodium bromide than the potassium salt. It is to be remarked further, when cases require the long-continued use of the bromides, the danger of cardiac failure is far greater with the potassium base.

In that important group of cases due to specific infection, in which potassium iodide has played so great a part hitherto as a curative means, the substitution of the sodium salt can be justified only by the clearest evidence of its superiority. I may observe

here that it is not the base that confers the peculiar powers on this binary compound, but that the iodides of sodium, strontium, calcium, etc., are effective, if not in the same degree, at least are similarly effective. I find by actual comparison of their powers in the treatment of the so-called "tertiary" that the sodium salt is somewhat less prompt, but is better sustained in action, that if it requires somewhat larger quantity, is without the irritating and depressing effects of the potassium salt. In fact, when in the treatment of gummata, or syphiloma of the brain or other parts of similar importance, the use of the iodide becomes necessary for long periods, it is a matter of common observation that the potassium salt is destructive in its influence over the metamorphosis of tissue, hurtful to the circulation, and highly irritating to the gastrointestinal mucous membrane. When iodism is caused by the potassium salt under these circumstances it is often remarkably virulent. On the other hand, although iodism occurs more quickly during the administration of the sodium iodide, it is never so severe, and rarely is more extended than the symptoms of an acute catarrh involving the upper air-passages.

In no malady have I seen better results from the use of the iodide and bromide of sodium than in neurasthenia, especially in those formidable examples of the disease characterized by frequent, almost incessant paroxysms of eructations, with violent, explosive manifestations, regurgitation of food, obstinate constipation, headaches, vertigo, insomnia, restlessness, and every possible form of morbid fear. An immediate relief to the severe stomachal distress is at once experienced, the appetite returns, the tongue is cleared of its heavy coating, the restlessness and wakefulness are lessened, and often cease altogether. In all forms of neurasthenia whether gastrointestinal, cardiac, sexual, or cerebral, in the predominant symptoms this same combination is very effective,—more so indeed than any other.

I am now about to state a fact which will probably be promptly questioned by my readers, but of the truth of which I do not entertain a doubt. I could submit many cases in detail if the space at my disposal would permit, but a mere reference to them must suffice. I refer to the curative power of the salts of sodium over certain examples of cancerous growths, more especially of epithelioma in its recurrent form. Instances are increasingly numerous in which, by

the exhibition of massive doses of the salts of sodium (chlorate, nitrate, phosphate, carbonate, etc.), morbid growths have been arrested in their development and slowly made to disappear, or their destructive qualities have been greatly modified. In my experience this is especially true of the iodides and bromides of sodium, given persistently in massive doses. Thus, in a case of epithelioma of the under lip, in a man of sixty years, which was removed by a distinguished surgeon of this city, there were symptoms of recurrence after two years of apparent cure. The indications of a return were pain in the upper part of the chest behind the manubrium of the sternum, radiating thence to the shoulders; swelling of the upper sternum and of the lower neck; paroxysms of asthmatic difficulty of breathing; croupy cough, etc. He was given scruple doses both of the iodide and bromide of sodium, with results that were marvellous, for in three months every symptom connected with the case had disappeared. Again, a lady of fifty years, stout, even obese in habit, who had passed the climacteric, began to have pain in the left breast, where a nodular tumor about the size of a walnut could be felt. Some tingling, burning sensations and lancinating pain were felt in the nipple, which was also changed in shape somewhat. She had declined considerably in weight, and was also becoming weaker. As her family history was unfavorable, several near relatives having died of malignant diseases, there was naturally much solicitude felt. The compound solution of iodides and bromides was administered in the usual way, with the result that the local pain and swelling ceased, and no further trouble has occurred since.

To illustrate further: A gentleman, sixty years of age, always a dyspeptic, two years ago began to suffer with symptoms of obstruction of the cardiac orifice of the stomach. He declined in flesh, became weaker, and an apparently characteristic cachexia developed. Although the diagnosis may be invalidated by the behavior of the case, yet the symptoms of increasing obstruction were so distinctive that it seemed to me no other conclusion could be justified,—in other words, the theory of a new formation would alone include all of the facts of the case. Under the use of the combined iodides and bromides, more or less iodism being maintained for considerable periods, the symptoms of obstruction finally disappeared, the general health greatly improved, and the supposed cachexia vanished.

CLINICAL OBSERVATIONS ON THE USE OF THE AQUEOUS EXTRACT OF SUPRARENAL CAP- SULE IN OPERATIONS WITHIN THE NASAL CHAMBERS.

BY JOSEPH A. MULLEN, M.D.,

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logical, Rhinological, and Otological Society; Member of the American
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WE are all familiar with the evanescent hæmostatic effect of cocaine in nasal surgery, and that almost immediately the tissues are incised the hemorrhage occasioned dissipates the local anæsthesia and washes the absorbed cocaine from the blood-vessels, so that the anæsthetic effect of the cocaine in operations within the nasal chambers rarely remains longer than the blood in the tissues, and passes away as the blood flows from the nose. We are also furthermore aware of the embarrassment and delay occasioned by the hemorrhage, which is frequently profuse, obscuring the field of operation, rendering frequent mopping with cotton necessary in order to keep the nasal chambers free from blood and clear for observation and operation. We are likewise cognizant of the advantages of a medicinal substance possessing the therapeutic properties of increasing the anæsthetic effects of cocaine and at the same time prolonging their action, and likewise having the additional action of preventing hemorrhage from the incised tissues during or after an operation; a substance which furthermore unquestionably has no detrimental action on the tissue to which it is applied either primarily or secondarily. The advantages, then, of a preparation of this character are to render a minor operation painless and almost bloodless, thereby admitting of its freer and easier performance and in every way enhancing its expediency and thoroughness of work, not to say anything of the operator escaping the trouble and worry which the pain and hemorrhage of an operation entail upon him. In the aqueous

extract of suprarenal capsule the rhinologist has a therapeutic agent which markedly increases anæsthesia and produces anæmia of the nasal mucous membrane, and at the same time contracts the basement membrane so that the mucous membrane is held down tightly to the periosteum. The extract to a very appreciable extent modifies the post-operative swelling, and it seems, moreover, to accomplish a more rapid healing of the parts and minimizes the danger of secondary hemorrhage that frequently follows nasal operations where cocaine is the only hæmostatic used.

The therapeutic principle upon which the physiological action of the extract of suprarenal capsule depends is the contractile power of the extract upon the small arterioles and the basement membrane, thereby retaining in the tissues the cocaine, increasing the ischæmic power of the latter. It reduces the nasal mucous membrane to a state of ischæmia, almost bleaching it, and in this way preventing hemorrhage and maintaining anæsthesia of the parts by keeping the cocaine locked within the tissues.

The local use of the extract is always preceded by painting the nasal mucous membrane with a five-per-cent. solution of cocaine, following this up in ten minutes with a solution of the aqueous extract of suprarenal capsule, preferably, if convenient, applied by cataphoresis. The solution is always made from the desiccated powder of the suprarenal capsule of the sheep, in the strength of five grains to the drachm of cold saturated boric acid solution, and filtered before using.¹

The solution decomposes very easily, and should be made fresh in a small quantity for each operation. It can also be used warm or hot when freshly prepared. It is not at all irritating, but rather imparts a cooling sensation to the mucous membranes. The astringent and anæsthetic effects last from one to two hours. Locally applied the drug is never followed by any constitutional manifestations, but when given hypodermically it is, however, attended with dangerous symptoms, the face becoming livid, and there is also great pain in the chest and head.² These untoward effects of the drug are unmistakably due to the action of the suprarenal capsule upon the small arterioles.

When using this drug in nasal work I always prefer to introduce

¹ N. Y. Med. Jour., May 16, 1896.

² Op. cit.

the extract directly into the tissues by the galvanic current. Experience has demonstrated this to insure a more prolonged and thorough effect of the drug. This method of application also intensifies, as well as lengthens, the anæsthesia and anæmia of the combined action of cocaine and the suprarenal extract. It furthermore prevents, to a decided degree, the secondary swelling, and influences a more kindly healing of the parts. The local use of the suprarenal capsule is not only of service in operations within the nasal chambers, but is of incalculable advantage, in combination with cocaine, in applications with the galvano-cautery, and also where chromic acid is applied to the mucous membrane. The induced anæmia of the nasal mucosa permits the cautery to penetrate into the tissues more thoroughly, down to the periosteum. I have used this preparation for over a year in all my nasal operations, and I have yet to see any bad or ill effects follow its use.

The following detailed number of cases will demonstrate the character of nasal operations performed and the results following the same with the above combined use of cocaine and the aqueous extract of suprarenal capsule. The aqueous extract of suprarenal capsule was first used locally in this country by Dr. W. H. Bates, of New York, and reported by him in his essay on "The Use of Extracts of Suprarenal Capsule in the Eye."¹ Dr. Lucien Howe, of Buffalo, has also contributed some clinical observations on the therapeutic uses of the suprarenal capsule in an article entitled "Note on the Therapeutic Action of the Extract of the Suprarenal Capsule in Certain Forms of Conjunctivitis."² Dr. Bates's observations have been clinically confirmed by Dr. Louis Dor, of Lyons.³

Dr. Armand Barraud, of Lyons, has made, by far, the most thorough and complete investigation in regard to the local and constitutional action of this valuable preparation. His results are recorded in the essay "Etude de la Vaso-constriction produite par l'Application locale de l'Extrait aqueux de Capsules surrénales."

CASE I.—Mrs. P., aged forty-eight years. Diagnosis, inflammatory glaucoma due to pressure of the enlarged anterior end of the middle turbinate of the right nasal chamber.⁴ Patient was ex-

¹ Op. cit.

² Moody's Mag. of Medicine, August, 1896.

³ Province Médicale.

⁴ Read before the Western Ophthalmological, Otological, Laryngological, and Rhinological Association, St. Louis, April 8, 1897. Laryngoscope, August, 1897.

tremely nervous and dreaded any operative procedure. General anæsthesia was out of the question in this case, as she had fatty degeneration of the heart. The hypertrophy was rather large, and occluded the superior and middle meati. A five-per-cent. solution of cocaine, with two drops of carbolic acid to the ounce of solution, was introduced into the tissues by cataphoresis. Ten minutes later a five grains to the drachm solution of the aqueous extract of suprarenal capsule was also introduced by the same process, and fifteen minutes allowed to intervene before the enlarged end of the turbinate was removed with a cartilage knife without the patient being at all aware or at all conscious of any pain. The operation was also completed without any hemorrhage. The patient was ordered to apply ice externally for three or four hours. There was practically no secondary swelling and absolutely no secondary hemorrhage. The patient recovered from the glaucomatous attack.

CASE II.—Mrs. N., aged twenty-three years. Diagnosis, catarrhal inflammation of the ethmoidal sinuses. This condition had existed for eight months and was associated with very severe frontal and supraorbital neuralgia. Her general system was very much depressed and she had almost reached a state of neurasthenia, being extremely nervous, very irritable, and with almost complete loss of appetite. A resection of the anterior end of the middle turbinate bone was decided upon in order to secure thorough and constant drainage of the ethmoidal cells after exploration of this cavity. The same procedure of application was used as in Case I., but not, however, using cataphoresis, as the patient was operated upon at home and not in my office. The resection of the anterior end of each middle turbinate was done a week apart, and in neither instance was there any hemorrhage during or after the operation and but very little pain. The ethmoidal cells were also opened at the same sitting with local anæsthesia, and the former drained, washed out, and packed with iodoform gauze. The patient made an uneventful and rapid recovery from the operation.

CASE III.—Mrs. C., aged twenty-six years. Diagnosis, reflex nasal cough dependent upon pressure of the middle turbinate bone on the septum nasi. Her general health is fair, rather nervous, neurotic temperament, and somewhat anæmic. The anterior end of the middle turbinate was also resected in this case for the relief of the cough of which she complained, the suprarenal capsule extract being

used as in Case II. There was slightly more pain than in either of the two previous operations, possibly due to the exquisitely painful condition of the parts from the pressure having been exerted for at least ten days. There was also some slight oozing of blood from the nose for four or five hours after the operation. The removal of the turbinate effected complete cure of the reflex nasal cough.

CASE IV.—Mrs. K., aged thirty-two years. Diagnosis, asthma, presumably dependent upon intranasal disease. The patient had had asthma for the past six years. Her general condition quite good, not at all nervous, but slightly anæmic and subject to frequent attacks of coryza. The right nasal cavity contained two bridges of bone, the first running from the septum to the middle turbinate and the second one from the septum posteriorly to the same bone. The suprarenal capsule extract and cocaine were introduced into the tissues as in Case I., and the bridges of bone were removed with a nasal saw, very little pain and no bleeding following the operation. The patient has almost escaped her usual asthmatic attacks.

CASE V.—Mr. A. S. K., aged twenty-one years. Diagnosis, supraorbital neuralgia of the left side. He has suffered more or less constantly from this pain since his fifth year, the neuralgic attacks being worse in damp and low countries and in rainy weather, and better in high altitudes and during the dry season. The condition was due to a rather large septal spur near the posterior one-third of the middle turbinate bone on the left side. He has always enjoyed good health and lives principally an out-door life. The combined solution of cocaine and the suprarenal extract was applied in this case by the aid of cataphoresis. Slight hemorrhage (oozing) several hours after the operation, but he suffered no pain while the septal spur was being removed. Result, cure of neuralgia.

CASE VI.—Mr. D., aged twenty-nine years. Diagnosis, occlusion of the right nasal passage dependent upon deflection of the nasal septum. Cocaine and suprarenal capsule solutions were used as in former cases, with the difference, however, of being allowed to remain a longer time in contact with the nasal mucous membrane. In operating the nasal punch was used, and the septum completely broken up and softened in its deflected portion. This was followed by practically no hemorrhage, but the patient experienced considerable pain, only, however, just for a second, while the punch pene-

trated the cartilaginous septum. The operation was followed by desirable results.

CASE VII.—Master H. J., aged ten years. Diagnosis, aural neuralgia. On examination found to be due to nasal spur and hypertrophic rhinitis of the right nasal cavity. The cocaine and suprarenal capsule were applied as formerly, and the nasal spur removed as well as a small bunch of turbinate hypertrophic tissue. The removal of these was accomplished without any hemorrhage and only slight pain, to which the little patient did not offer marked objection. The result was the entire disappearance of the aural neuralgia, from which he had suffered for five days.

It is hardly necessary, after giving the histories of the above enumerated cases, to add any more to demonstrate the valuable aid that the aqueous extract of suprarenal capsule has rendered as a hæmostatic and an analgesic in our experience in nasal surgery. The above cases, with several exceptions, may be considered major operations within the nasal cavity. Operative procedures which would ordinarily call for the administration of a general anæsthetic and entail the danger and inconvenience accompanying its administration, and the tendency to secondary hemorrhage afterwards. Instead of these we are enabled to operate with very little inconvenience to the patient and with far more ease to ourselves, and with no danger at all of being called up at midnight to stop a profuse secondary hemorrhage from the nose. The patient also is relieved of the disagreeable features and dread of inhaling chloroform or ether, and after the operation is enabled to go home and carry out your instructions intelligently; in other words, it reduces a major nasal operation to one of minor importance. We have observed that after the use of the suprarenal capsule extract healing of the operated parts more quickly follows, and also there is less swelling than when cocaine is alone used or when the operation is done under general anæsthesia. There is undoubtedly less post-operative swelling than when the extract is not used. We have also failed to observe in cases in which the extract of suprarenal capsule had been used any symptoms of cocaine poisoning.

In none of the cases was there the slightest evidence of cocaine toxæmia. The *rationale* of this entire absence of the latter, when the extract is used, we are unable to give, but it is unmistakably a fact. We would suggest the further extended use of this valuable

preparation to other operative procedures in surgery, whether in gynaecology, laryngology, or genito-urinary operations; in fact, it can be made use of upon any mucous surface without any danger of constitutional symptoms or untoward local effects, and when used with cocaine the danger from absorption of the latter is greatly minimized. For instance, it could be advantageously used in dilating or cutting strictures of the urethra. The cocaine used would not be as easily absorbed as when the extract is not used. The suprarenal capsule would also prevent pain and hemorrhage, two things of which this particular class of patients is excessively afraid. It would also prevent secondary swelling, and these altogether seem to the writer to be valuable qualities of a drug used for this purpose. It has no effect whatever when applied to the skin, and does not produce of itself any anæsthesia, unless used in combination with and after the local application of cocaine or eucaine, and then only on mucous surfaces.

Treatment.

THE VALUE OF VENESECTION IN CERTAIN CASES OF HEART-FAILURE.

CLINICAL LECTURE DELIVERED AT THE LONDON HOSPITAL.

BY FRANCIS WARNER, M.D. (Lond.), F.R.C.P.,

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GENTLEMEN,—Among the patients recently in the wards of the hospital there have been three cases of severe illness, with impending death, in which the life of the patient was in all probability saved by the employment of venesection. In each of the cases that I shall narrate to you the patient was nearly moribund, and very rapid and striking relief followed the blood-letting, mainly from the consequent improved action of the heart.

We will briefly consider the results of drawing blood from a vein as it affects the heart and the circulation. In the ordinary mode of venesection the arm is bandaged above the elbow, and the median-basilic vein is then incised. Blood flows from the wound, lessening the mass of blood in the limb below the ligature; as a result the capillaries are emptied, arterial pressure is lowered, tension in the left side of the heart and pulmonary veins falls, so that the blood flows more easily through the lungs. These effects follow quickly. The capillaries of the lungs being thus partially emptied, the right ventricle works with less effort and more readily receives blood from the veins. In two of the patients the right jugular vein was incised, here the results differ somewhat from those of arm-bleeding. When the right jugular vein is opened, especially if it be much distended, and the right heart is overfull from increased blood-pressure, a stream of blood may spurt out, depleting the right auricle and ventricle; if pressure is made upon the vein *above* the incision, this

is almost the only source of bleeding, the stream from the head being arrested by pressure. I usually prefer this mode of venesection when employed to relieve over-distention of the right heart, and have frequently done so without difficulties arising. Venesection gives relief in heart-failure by lowering arterial tension, as when blood-letting is performed in the arm, and also by quickly relieving over-distention of the right side of the heart which is most directly effected by incision of the right jugular; as long as the blood-stream spurts out there is no fear of air being sucked into the vein during inspiration. The muscular fibres of the right ventricle become stretched when it is over-distended. Experiment shows that when a muscular fibre is stretched to its full extent it acts at a disadvantage, and that to exert its full contractile force it should never attain its maximum elongation. When the ventricle is over-distended the withdrawal of a few ounces of blood from the jugular allows the muscular wall of the heart to contract with greater force.

Some of the principal cases for the employment of venesection are where cedema of the lungs and acute bronchitis threaten the life of the patient during the course of heart-disease, whether from valvular defect or degeneration of the muscle. A similar condition of lung occurring in the course of acute pneumonia may call for similar treatment. In some cases of pressure on the great veins in the chest by aneurism or mediastinal tumor, temporary relief may be given in attacks of urgent dyspnoea with cyanosis.

I will now read notes of the cases.

CASE I.—The patient was a very stout, heavy man, weighing over twenty stones;¹ he was sixty years of age. Twenty years previously he had suffered from an attack of acute rheumatism, and said that ever since he had at times been liable to swelling of the legs; this condition had confined him to his bed for three months previous to his admission. On examination his heart was found to be enlarged, with a diffused impulse, the apex-beat being displaced outward and downward; the right ventricle was also felt distinctly in the epigastrium; its action was irregular and the sounds were very indistinct. There was a mitral regurgitant bruit, both ventricles were dilated, and the pulse was small, irregular, and weak. Over the chest the breath-sounds were very weak, with other signs

¹ *I.e.*, over one hundred and forty pounds.

of emphysema; at the bases behind there were rhonchi and râles, indicating bronchitis with congestion of the lungs. The patient suffered considerably from dyspnoea. The liver was felt enlarged and tender, extending nearly to the umbilicus; there was moderate jaundice. Ascites was marked, and the abdominal walls, as well as the legs, were tense with solid oedema. The legs were tense with cedematous swelling; the skin was inflamed and erythematous from the feet half-way up, the thighs measuring thirty-six inches round each leg.

The left leg was deeply ulcerated, granulating, and producing a very foul secretion.

The urine was of fair quantity; specific gravity 1010, with a trace of albumen.

A fortnight after admission the patient had a severe attack of dyspnoea, with convulsive twitchings of the forearms, while consciousness was impaired. He became markedly cyanosed, black in the face, with great distention of the veins in the neck. The signs of congestion of the lungs increased.

The right external jugular vein was opened and fifteen ounces of blood were withdrawn; at first the blood spurted out, afterwards falling to a dribble. The patient was a little relieved, but appeared to be in a dying condition, so that it was not thought well to draw more blood. A pad and bandage were applied to the neck.

About three hours later, during an attack of coughing, the wound in the vein started bleeding profusely, and about twenty ounces escaped before the vein could be ligatured. Just before this was effected the patient suddenly looked up and remarked, "Why, I feel quite well now." During the next fortnight he improved greatly in every way. Then a second attack of urgent dyspnoea occurred, and the patient became cyanosed and almost comatose, with a fluttering pulse. The left external jugular was opened, and, twenty-five ounces of blood being withdrawn, the vein was secured. The patient at once showed marked improvement, his breathing became easy, a good color returned, and the pulse became more regular. From this time he steadily improved, the ascites and oedema disappeared, the ulceration of the legs healed, and he was discharged eleven weeks after admission to the hospital and resumed his work as a miller.

This patient was an unfavorable subject for venesection on

account of his long standing mitral regurgitation, which had previously led to œdema; while the epigastric pulsation, the pulmonary congestion, the enlarged (cardiac) liver with ascites, and his generally "water-logged" condition when admitted to the ward showed great embarrassment to the circulation. During the severe attack of dyspnœa with cyanosis his brain was probably congested, as indicated by his comatose condition and semi-convulsive movements. The man was so nearly moribund that only fifteen ounces of blood were drawn from his jugular, but it is clear, from the sequel of the case, that a larger withdrawal of blood was needed to remove the congested condition and relieve the over-distended right ventricle. The ultimate absorption of his ascites and œdema showed restoration of the balance of circulation following the treatment.

CASE II.—The patient was a man thirty-eight years of age; he was of intemperate habits, and had suffered from winter cough for some years, but no acute illness. When admitted to the hospital his lungs were found to be emphysematous, with sibilant and sonorous rhonchi all over the chest; respirations, thirty-six to the minute. The heart appeared healthy, and the sounds were clear. The urine contained a trace of albumen. The bronchitis and difficult breathing had lasted four days before admission.

The patient soon became worse, the dyspnœa increasing with orthopnœa and congestion of the face; there was an increase of the râles heard over the chest. He showed considerable prostration and sweated profusely. In the evening he became violently delirious and noisy, and was very weak, with periods of great dyspnœa. There were tremor and heart-failure, with a rapid and weak pulse, and some cyanosis, the veins being moderately distended; his respirations became short, seventy-two to the minute. He was so noisy and violent that he was placed in the padded room. Twelve leeches were applied to the chest, affording some temporary relief. That evening the dyspnœa became more urgent, with general capillary bronchitis, and fifteen ounces of blood were withdrawn from the left arm; this relieved the patient greatly, and he slept well. After this the man soon began to recover; he expectorated freely, the pulse became regular and his color good. He was discharged well a month after admission.

This patient was also a bad subject for treatment, being a hard drinker. The acute bronchitis and cardiac failure would probably

have proved fatal without the aid of venesection. It is noteworthy that bleeding from the arm was quickly followed by relief to the lungs, and this in turn gave so much relief to the cerebral circulation as to produce good sleep with subsidence of the delirium.

CASE III.—A man, fifty-three years of age, was admitted to the hospital with bronchitis supervening upon emphysema; there was much weakness of the heart's action without valvular disease, and the urine was albuminous. The second day after admission the patient had an urgent attack of dyspnoea; he was seen propped up in bed, black in the face, and unconscious, while irregular fluttering palpitation of the right ventricle was felt at the epigastrium. A vein was at once opened in the right arm; a small quantity of dark venous blood trickled out as the only result. A hypodermic injection of one-sixtieth of a grain of strychnine was then administered, and this was followed within sixty seconds by the out-spurting of a strong flow of venous blood, which continued till thirty ounces were withdrawn, when the patient was greatly relieved and recovered consciousness. Three days later a similar attack recurred, when twenty ounces of blood were drawn from the right jugular vein, again with marked relief. The patient did not appear to suffer from the loss of blood. Later in the illness thirty ounces of serum were withdrawn by aspiration from the right pleura. The man made a good recovery, and after discharge from the hospital resumed his work.

The employment of a hypodermic injection of strychnine was here very beneficial and acted rapidly, increasing the strength of the cardiac contractions; without it the venesection would, I think, have failed to give benefit.

You must not expect always to meet with the same success as that shown in these cases, but you will find venesection a valuable means of saving life in certain cases of urgency. Additional therapeutic means may be useful in these cases: where the "water-logged" condition occurs, incision of the legs and free drainage, or the removal of hydrothorax or ascites, may be required. The heart may be stimulated by the employment of stimulants and hypodermic injections of ether, strychnine, or digitalin, while inhalation of oxygen gas or ozone will improve the condition of the blood and aid its free circulation through the lungs and the brain.

THE TREATMENT OF ACNE.

BY M. B. HUTCHINS, M.D.,

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Atlanta, Georgia.

GENTLEMEN,—There is much about acne in the books, a number of monographs upon the subject, and many short articles in journals have appeared. For the purpose of this article it has been thought best to omit all reference to authorities and their varying or harmonizing views, and limit myself to my own experience and my case-records, whether that experience may have been with remedies and methods suggested by others or remedies and methods used according to the rules of "general principles." The fact that opinions differ as to the best methods of treating acne does not show that it is an incurable disease; it shows that there are various ways of attaining its cure or removal.

The prognosis is of interest, before discussing the treatment. I believe there rarely exists an acne of any form which will not yield to persistent and thorough treatment. But the removal of the disease and the prevention of its return are two different things. We can pretty safely promise to remove, or keep in abeyance, the lesions, but we must give a guarded prognosis as to a return. The eruption may be cured, apparently, in from one week to six months, but the return of it may occur upon the appearance of the slightest disorder in the general economy.

I have seen a case of acne of the back, apparently cured by six months' faithful treatment, relapse after some alcoholic indulgence by the patient. Relapse at the menstrual periods is quite common. Occasional indigestion or constipation causes relapse or keeps up the disease. As long as the period lasts in which acne occurs there is a liability to relapse from a repetition of exciting causes. I have not been able to obtain evidence in my practice that continence, incontinence, or masturbation has any influence in the production

or continuance of the disease, and have ceased to investigate or advise regarding these matters.

As in many other diseases of the skin, we find no specific internal or general cause of acne, but we must direct our general treatment simply to any existing disorder, with a view to such improvement of functions that the skin, sharing the benefit, will be able to resist the disease.

The acne is frequently a barometer indicating that something is out of order, and this often before the patient quite becomes aware that such disorder is to be felt.

For the first few years of my experience I was prone to depend wholly upon the local treatment, but I now know that our results will be more satisfactory and permanent if we can find and remove some general deviation from the standard of health.

Yet, if I had to choose between a purely local and a purely constitutional treatment, I should take the former without hesitation. By persistence in local treatment alone it is possible to get the skin into better habits, as it were, and by our efforts force the acne to remain away in discouragement. Such expectation, however, is not a logical one, and we may be disappointed in a large majority of the cases.

The internal treatment need be discussed but little, because the acne does not alter the principles upon which any practitioner would treat similar internal conditions in patients without acne.

Diet should be plain, wholesome, and in moderation; no over-eating. Regular sleep and exercise, of proper adaptation to the patient's needs, are beneficial.

As a mild tonic I have used—

R Tinct. cinchonæ comp.,
Tinct. gentian. comp., aa \mathfrak{z} iss. M.
Sig.—Teaspoonful after meals.

With the hope of reflex benefit to the skin,—

R Liq. potass. arsenit., \mathfrak{z} i;
Tinct. gentian. comp., \mathfrak{z} iii. M.
Sig.—Teaspoonful after meals.

A reliable essence of pepsin is of use in aiding stomachic digestion. This preparation may also be used as a menstruum for the administration of other drugs, replacing water or a bitter tincture.

To pale and weak patients with whitish stools I have given—

R Hg. bichlor., gr. $\frac{1}{4}$;
Tinct. nucis vom., \mathfrak{zss} ;
Tinct. cinchonæ comp., ad \mathfrak{z} i. M.
Sig.—Teaspoonful after meals.

The mercurial was reduced if the original quantity proved too laxative.

As an aid to digestion I have also given—

R Tinct. nucis vom.,
Acid. nitric. dilut., \mathfrak{aa} \mathfrak{zss} . M.
Sig.—Ten minims an hour before meals.

For conditions of so-called biliousness, one-tenth of a grain of calomel every hour for five to ten hours.

For patients with scant, red urine,—

R Tinct. nucis vom., \mathfrak{z} iss;
Potassii acetat., \mathfrak{z} i;
Aquæ, ad \mathfrak{z} iii. M.
Sig.—Teaspoonful after meals.

The remedy *par excellence* in constipation I have found the following:

R Tinct. nucis vom., \mathfrak{z} i to \mathfrak{z} ii;
Cascar. sagrad., fl. ex., \mathfrak{zss} to \mathfrak{z} i;
Glycerin, \mathfrak{z} i;
Aquæ, ad \mathfrak{z} iii. M.
Sig.—Teaspoonful after meals.

A smaller dose is probably sufficient if taken a half-hour before meals. This mixture is sometimes purgative, either because of the patient's susceptibility or because of adulterated cascara. The dose must be graded to the needs of the patient. A purgative action is not desired, and the remedy must be kept up for some time in sufficient quantity to keep the bowels regular. In many cases the constipation will be cured.

For anæmic patients, with irregular action of the bowels:

R Cascar. sagrad., fl. ex., \mathfrak{z} i;
Fer. sulph. exsicc., gr. xii;
Aquæ, ad \mathfrak{z} iii. M.
Sig.—Teaspoonful after meals.

Another tonic laxative (after Startin):

R Fer. sulph., gr. xlviii;
 Magnes. sulph., ℥iss;
 Infus. quassiae, ad ℥iii. M.
 Sig.—One drachm after meals.

Glycerin suppositories are useful in atonic constipation. Many cases of acne show evidences of anæmia, and are much benefited by iron internally.

Two-grain dried sulphate of iron pills, or the above with tinctura cinchonæ composita or the syrup of the iodide of iron, may be used. Some of the so-called "blood-iron" preparations have been very useful in these anæmic cases, and the improvement in the patient's color and condition is often striking.

I have not attempted the treatment of female patients who had functional or organic trouble with the organs of generation, believing such treatment properly in the province of the family physician, or a gynecologist.

Two things are essential in the successful removal of general disorders, with appropriate remedies,—viz., honesty on the part of the druggist, and the faithful following of directions by the patient. A crop of acne lesions will often tell the story of neglect or imprudence, and such neglect or imprudence must always be placed to the credit, and not to the debit, of the physician in the result.

Local Treatment.—Various methods of treating acne locally are recommended. With regard to some of the details, the views of authorities are diametrically opposed. I shall give the result of my own experience, about which I have no doubt.

As routine measures: All comedones must be extracted with the proper comedo-presser. Steaming, to permit their removal, I have not used. Glycerin for the same purpose is of doubtful efficacy. Strong soap removes excess of sebaceous matter and helps clear out the follicle-mouths. For this purpose we may use, with success,—

R Alcohol, ℥i;
 Saponis viridis, ℥ii. M.
 Sig.—Well rubbed in, as a routine measure.

R Acid. salicyl., ℥i;
 Glycerin, ℥i;
 Alcohol, ℥ii. M.

or,

R Acid. salicyl., ℥iii;
Resorcin, ℥i;
Alcohol, ℥ii. M.
For a similar effect.

The removal of comedones must be done with sufficient care to prevent the formation of traumatic lesions. Where the patient must use a watch-key, it must be large and its edge blunt.

After the removal of the "blackheads" the local remedies in use for the disease must always be applied. Mild antiseptics are essential to the prevention of infection. Muddy-looking skins with sluggish circulation are bathed once or twice a day in water as hot as can be borne,—never lukewarm. Sponging of the face with alcohol relieves oiliness, and has a stimulant effect on the skin.

As a regular procedure by the physician, every acne lesion, save those minute ones typifying acne simplex, should be punctured with the acne lancet, or a thin, pointed knife, whether the lesion be in its first, acute, hot, tender, solid stage, or in any stage up to free suppuration. If the acute, new lesions are so punctured, they usually stop there and are gone in a few hours. Unless the operator is careless in his antiseptics, no scar remains. Any retained sebaceous matter is pressed out, and the bleeding which follows the puncture removes the active congestion of the capillaries involved. If pus has already formed, the puncture permits its free removal, and proper antiseptics prevent continued or auto-infection. Carbolic or bichloride water, or the antiseptic application which is being regularly used by the patient, will meet the indications for antiseptics after the opening of the lesions.

If the lesions are large, with a considerable cavity, as in acne indurata, it is well to apply ninety-five per cent. carbolic acid to the cavity, as a destruent of necrotic tissue, an antiseptic, and a stimulant to healing.

If the lesions are very gross, and perhaps confluent, they must be freely incised, cleared of their contents with the curette, and then swabbed with the carbolic acid. Antiseptic, protective dressings may be necessary to perfect this procedure. Scarring, if it occurs at all, will be less after the above method of treatment than if we leave the lesions to rupture spontaneously. Now, a number of lesions will subside under the use of local applications, but the treatment as given above offers more certain assurance of permanence of

removal. Sometimes touching the tops of the smaller, recent lesions with liquefied carbolic acid, or other antiseptic irritant, causes their subsidence, through some combination of counterirritation and antiseptis. The application only produces a superficial scale.

Small or superficial lesions may also be caused to disappear rapidly by "knocking off their tops" with the curette, followed by the application such as used after puncturing. Very minute pustular lesions only need their tops "picked off."

In all but the acute cases the use of hot water to the affected parts has been a part of the treatment, acting, apparently, as a stimulant. Where the skin is oily, as is so often the case, the liberal use of some strong soap, or soap mixture, is of advantage. Friction, as with a coarse towel, is also a beneficial procedure.

I have never employed massage. Those patients who had been in the hands of so-called masseurs reported that this treatment had aggravated the disease. Whether the massage or the masseur was to blame is uncertain; it was probably the masseur.

Proper massage, together with appropriate treatment as indicated, should be beneficial.

The patient should not squeeze or "pick at" the lesions, as that does harm.

It is well for the patient to wash the affected areas always with some antiseptic solution. If sulphur is being used in the local applications, no mercurial must be used, in any shape, because of the blackish combination with the sulphur, appearing as multiplied comedones and even spots of blackish color.

The galvanic current, three to five milliampères, for five to ten minutes a day, the poles to the cheeks and changing them at intervals, has seemed beneficial in sluggish cases. Electrolysis in the lesions is worthy of trial.

Very large indurate masses may be treated with poultices, preferably antiseptic, to hasten suppuration, where it is thought best not to incise them at once.

Where patients must carry out much of the treatment at home, they must open or incise the lesions with a sterile needle or lancet, under antiseptic precautions, and use the regular local applications thoroughly.

The small acne lesions, save "acne punctata," are not so liable to recurrence after removal as are the larger indurate.

Stains left from severe old lesions disappear in the course of time, but scars may remain where treatment was never used, sometimes giving the impression of pits from variola.

Now, as regards the medicinal local treatment, sulphur in some form has long been used and its efficacy is undisputed. In fact, my experience is that a sulphur preparation, or one composed in part of a sulphur element, affords the best local application for these cases. The small, firm, acne simplex papules, however, yield the least readily to this remedy.

The familiar "lotio alba," or the "lotio alba cum sulphure," is one of the very best sulphur preparations. Lotio alba is as follows:

R Zinc. sulphat.,
Potassii sulphid., aa gr. xv. } dissolve separately;
Aquæ (seu aquæ rosæ), ℥i. M.

Sig.—Shake, apply frequently, three or four times a day, let dry on, rub in the residue.

The lotio alba cum sulphure is the above with the addition of the same quantity of precipitated sulphur as the other ingredients. The latter has seemed the most generally useful to me. I have used it in the great majority of my acne vulgaris cases, and there is no doubt of its beneficial action. Of course, it must not be used in a very acute condition, where the face is quite markedly inflamed. The inflammatory condition must first be removed. In some cases, as those with many large, indurate, and suppurating lesions, I have doubled the strength of the ingredients or increased the sulphur. In a few instances, where much oiliness was present and an especially drying effect was desired, I have replaced half of the water with alcohol.

The effect of the application is to produce drying and constringing of the skin. After a few days' use slight or marked irritation occurs. It may then be necessary to suspend the use of the lotion. In some cases the simple suspension of the use of the lotion and stopping the hot water and friction suffice to permit the early subsidence of this irritation. Sometimes the use of the lotion can be continued in the day and the following at night:

R Ichthyol, gr. xx;
Ung. zinc. oxid., ℥i. M.
Sig.—Keep well on.

The ammonium-ichthyo-sulphate is usually dispensed when ichthyol is prescribed. It is a valuable remedy in ordinary acne, both

because of its sedative action and its contained sulphur. The percentage used in the prescription is regulated by the condition present and the effect desired.

Ichthyol may also be added to the *lotio alba cum sulphure*.

For comedones and *acne simplex* the following is very effective:

R Sulphur. precipitat., ʒiiss;
Saponis viridis, ʒii;
Alcohol, ʒi;
Spir. violet, ℥x. M.

Sig.—Shake, apply, let dry. Leave on over night.

In many cases a sulphur powder is useful, both as a routine application and for use after puncture of lesions and the removal of comedones. One of these powders may well be kept in the office for the latter purpose.

Following are examples of these powders:

R Sulphur. precipitat., ʒss;
Talc. venenat., ʒvii;
Aquæ violet, q.s. M.

I have used the above in an attempt to obtain electric cataphoresis in one case of *acne*.

Another powder:

R Sulphur. precipitat., ʒi;
Magnesiæ carbonat., ʒvii. M.

This is more sedative than the first, owing to the *magnesia*.

Another powder used after instrumental treatment is,—

R Sulphur. precipitat.,
Pulv. "sachet," aa ʒss. M.

A stronger one used in general:

R Amyli pulv., ʒi;
Sulphur. precipitat., ʒii. M.

Ointments and oils are not so useful in *acne*, because of their mechanical plugging of the sebaceous ducts and adding to the, commonly, excessive greasiness already present in the skin.

The following has, however, been used as a mild substitute for other applications:

R Sulphur. precipitat., gr. xv;
 Amyli pulv., ℥ss;
 Ung. aquæ rosæ, ℥ss. M.

The following was found less efficacious in seborrhœa and acne of the chest than the sulphur mixtures:

R Resorcin, ʒi to ʒi;
 Aquæ,
 Alcohol, aa ʒii. M.

For fine, papular acne the unguentum hydrargyri ammoniati, or a modification of it, is often very useful, the mercurial seeming to hasten the absorption of the so often chronic lesions.

Mercurial preparations, especially of the bichloride, have not been of as much use in acne vulgaris as one would expect, ranking much below the sulphur combinations. They may also produce dermatitis and itching.

Simple acne and seborrhœa oleosa were apparently benefited, in one case, however, by—

R Hg. bichlor., gr. iv;
 Resorcin, ℥ss;
 Alcohol, ʒii. M.

Hydrogen peroxide has been of use for the removal of the color from the blackheads present. It rendered them less plain, but was rather irritating.

Very little effort has been made to remove the stains, and none against the scars, left by acne. It is doubtful if much can or need be done for these conditions. Time does much.

For the irritation so often produced by the sulphur applications, especially the lotions, a great many local, sedative mixtures have been used. In fact, this condition frequently requires much experimentation for the attainment of the end desired, and we find more cases of acne suited to one application than we find cases of irritation relieved by one attempt at sedation.

For much scaling and dryness after the sulphur lotion the following is effective:

R Ol. olivar., ʒii;
 Ung. aquæ rosæ, ʒvi. M.
 Sig.—Keep well on.

Or we may use—

R Acid. boric., gr. v ;
Ol. olivar., ℥ss. M.

For a soothing effect and the removal of scales:

R Ol. olivar., ℥iii ;
Alcohol, ℥v. M.

Or, for faint redness and scaling following irritant applications:

R Ol. olivar., ℥ii ;
Ether. sulphuric., ℥i. M.
Sig.—Apply frequently.

Another "soothing" application:

R Magnesiae carbonat., gr. x ;
Ol. amygdalæ dulc., ℥i ;
Ung. zinc. ox., ad ℥ss. M.

Sig.—Apply well at night. A little may be kept on in daytime if needed.

The above list might be lengthened, but the formulæ given indicate the kind of applications which are useful.

For very acute, inflammatory outbreaks of acne, we may use:

R Ichthyol, ℥i ;
Ol. amygdalæ dulc., ℥i ;
Alcohol, ℥ii. M.
Sig.—Apply well pro re nata.

R Ichthyol, gr. l ;
Magnesiae carbonat., gr. xl ;
Aque, ℥ii. M.
Sig.—Shake, apply t. i. d.

The various prescriptions given are intended only to present the average formulæ of use in the different conditions. It is self-evident that every physician must, and should, have latitude in the use of any drugs and methods of treatment, and that it is better to do nothing by rote or routine, but each case must be treated according to its requirements and with such prescriptions as are adapted to the individual indications.

THE USE OF CREOSOTE AND CREOSOTE DERIVATIVES IN THE TREATMENT OF TUBERCULOUS AFFECTIONS, IN PARTICULAR OF PHTHISIS.

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It is necessary that we should from time to time take stock of the means at our disposal for the treatment of disease. At the recent International Medical Congress held at Moscow, Professor Leyden, of Berlin, reviewing present methods of treating tuberculous patients, first dwells on the necessity, in order to prevent the spread of the disease, for the adoption of carefully controlled hygienic measures and the disinfection in particular of all articles likely to be soiled by the expectoration of consumptives. Upon these prophylactic measures, whilst fully admitting their importance, it is not necessary to dwell here. Professor Leyden proceeds to confess, however reluctantly, that up to the present moment we do not possess any means of directly attacking the bacillus itself; with this also there will be general agreement, though Koch's new tuberculin has not yet received sufficient trial; and he goes on to state that our endeavor must be to so raise the vitality of the patient that he may be enabled successfully to cope with the hostile forces of the microbes. On the list of agencies adapted to effect this, we find mentioned climate, open air and ventilation, nourishment, exercise, methodical treatment in special institutions, and, lastly, medicinal treatment as auxiliary to the general treatment.¹ It is to the last named we would draw attention.

The use of creosote and creosote derivatives in the treatment of phthisis has of late years found much favor; it is antiseptic in its intention, the endeavor being to directly attack and destroy the tu-

¹ See *Lancet*, September 18, 1897.

bercle bacillus if possible, or, failing in this, to lessen its harmfulness, and so turn the scale in favor of the resistance opposed by the tissues. In the employment, therefore, of creosote, as of any other antiseptic medication, the object to be aimed at will be the determination of the minimum dose required to destroy the bacillus, or, should this prove impracticable, the maximum restraining dose, which the tolerance of the tissues will enable us to bring to bear. Practically, as the question stands at present, we are in search of the maximum dose of restraint which, by one or other antiseptic, we can make available in a given case, for we possess no drug which is capable, as Professor Leyden admits, of directly attacking and destroying the bacillus once it has successfully invaded the tissues. Now, the limitations which the tolerance of the tissues impose upon the dosage of a given drug are of two kinds,—viz., first, there is the limitation which is set by the tolerance of the organ through which the drug is introduced into the system, and, secondly, there is the limitation set by the tolerance of the tissues of the body generally, or of the most susceptible of these tissues, after the drug has entered the system. These tolerances make this or that drug available or not available in practice.

In the treatment of consumption, as is well known, we are compelled to pay very special attention to the state of the alimentary tract, inasmuch as an irritability, gastric and intestinal, frequently marks the disease. So much, indeed, is this the case that the state of the alimentary tract may be regarded almost as the key of the situation, and that a proper handling of a given case will necessarily involve a most watchful care over the digestive and assimilative processes. On this subject, Dr. Volland¹ has entered a very weighty protest against the routine overfeeding intentionally practised in many of the institutions specially set apart for the treatment of phthisis, a practice liable to be followed by gastric catarrh and gastric atony, with disastrous results. Accordingly in our employment of drugs in phthisis we must very carefully guard against disturbance of this kind, whether of the stomach or intestines.

Creosote has been tried, on a very extensive scale, more especially since its revival of late years, and it has yielded a success sufficient to insure it an established place among drugs useful in phthisis.

¹ *Therapeutische Monatshefte*, September, 1895.

It is maintained of creosote that it relieves the cough, diminishes the expectoration, lowers the fever-heat, checks night-sweats, and that at the same time it *improves* the appetite and digestion and diminishes the tendency to diarrhoea; this statement, taken from Whitla's "Handbook of Treatment," represents fairly the claims made in favor of this drug.

Whilst, however, there is a fairly general consensus of opinion as to the value of creosote *qualitatively*, we find that *quantitatively* there is great diversity of practice, the dose varying within wide limits; thus, in England generally one to three minims *pro dosi* would perhaps represent an average administration, though occasionally the dose will have risen to five minims thrice daily, and very exceptionally it will have reached ten minims. On the continent fuller doses have, in general, been given, and in France creosote is now given in quantities which may reach to thirty grains (two grammes) *pro dosi*, and seventy-five grains (five grammes), *in die*.¹ In Germany the doses have been larger than our own, on an average, in spite of the fact that the German Pharmacopœia gives three grains as the largest single dose, and fifteen grains as the largest dose *per diem*. In America an upward tendency of the dose has been observed, and the drug is prescribed in doses mounting up to ten minims. Of late certain firms doing business in this country and in America have put forward the statement that by a special process they have been enabled to prepare a creosote which may be given in the dose of thirty minims (gradually reached) thrice daily.

Without going further into this question of dose, we have sufficient information to show us what a want of uniformity prevails in practice and within what wide limits the drug is prescribed quantitatively. When we come to inquire into the cause of this great variation in dosage, we are met with a fact which, though it may in part explain the facts of practice, obscures, unfortunately, the whole subject,—viz., the great variability in the composition of pure beechwood creosote, so called, as it is presented to us in the market. On the authority of Mr. William Martindale, I have it that all varieties of creosote trade under this name, the cheaper kinds with probably little more than a trace of guaiacol in their composition, whilst the

¹ On the continent it is the practice to weigh the liquid; the grain may be taken as the equivalent of the minim.

dearer kinds may correspond to the requirements of the French Codex, and contain twenty per cent. of guaiacol. From the same source I learn that the creosote with which Dr. Gimbert and others in France obtained their first successes was obtained from pine-wood and was almost devoid of guaiacol. To add to the difficulty, and, no doubt, a partial explanation of the variability in the constitution of commercial creosote, is the fact that the identification and percentage determination of the several constituents of creosote is a difficult matter, depending upon a tedious process of fractional distillation. From this it comes that there is no reliable, ready method for estimating the quality of the drug supplied.

Under these circumstances it will be apparent how very little real meaning is conveyed by mere statements as to the dose of a medicine so ill defined, and how essential it is for all those working with the drug to state as fully as they can the kind of creosote employed. The guarantee afforded by the name of the supplying firm, and even of the price paid, is of sufficient importance to make it advisable to add these details; the cheaper kinds of creosote will certainly not be rich in the more valuable guaiacol. Mr. Martindale tells me the specific gravity should be about 1080.¹

However, so extensive has been the use of creosote in medicine that, notwithstanding the statements just made, and, indeed, admitting to the full the unsatisfactory state of things as they exist, we may yet, I think, draw two legitimate conclusions even at this stage,—viz., first, that the therapeutic value of creosote does not belong exclusively to any single one of the phenol derivatives which compose it, therefore not exclusively to creosol or guaiacol, to phlorol or cresol. In respect of guaiacol this seems to be sufficiently proved by the first successes, attained with a creosote practically devoid of guaiacol, and, I may add, the therapeutic value of creosotal (to be described shortly) bears out this conclusion. Then, secondly, we may conclude that the smaller doses—*e.g.*, one to three minims—are far below the limits which may be attained in a large number of cases. I shall have to refer to this again when I come to speak of the practice which obtains at the Victoria Park Hospital for Chest Diseases.

When creosote in concentration is applied to the tongue, say, it

¹ These higher specific gravity creosotes do not, however, encapsule well, being more solvent of the gelatin. (Martindale.)

causes a considerable burning, and, in fact, a mild caustic action. This experience is really responsible for the small doses which have prevailed and the extreme caution observed in raising the dose. On theoretical grounds, it has been urged that a similar action must be exerted upon the delicate mucous membrane of the alimentary tract, and that an incautious administration was likely to be followed by a gastro-intestinal upset,—a result to be avoided above all other things in phthisis. This theory, based on too limited an experience, has not only controlled the dosage of creosote, but it has led to the introduction of various modifications of creosote or its derivatives. To these I would now refer.

If we consult Merck's reports from 1891 to 1897, we find the following creosote derivatives in use: Creosote carbonate (creosotal), creosote oleate and valerianate, guaiacol carbonate, valerianate, phosphate, and also the ethylene ether of guaiacol, and benzosol, or benzoyl guaiacol.¹ These compounds severally yield up to the tissues when they enter the system, or whilst still in the alimentary tract, creosote or guaiacol; they are by structure rich in these bodies, and they are employed really because they are vehicles of creosote or guaiacol. Their great virtue is that they are less irritant locally, and hence may be given in large dose without fear of alimentary derangement; they jump, as it were, the local intolerance and enable us to saturate the whole system with creosote or guaiacol up to its toleration point. A minor advantage they also possess,—viz., they have less taste.

Benzosol has been more prescribed of late, but creosote and guaiacol carbonates are, probably, the derivatives which have been the most employed. The former is a viscid, somewhat oily liquid, the latter is a crystalline substance. The creosote compound is the less definite; it is said to consist of the carbonates of creosol and guaiacol, but Mr. Martindale informs me that most of the guaiacol is removed in the process of manufacture, as the carbonate, on account of its greater value. Guaiacol carbonate as a well-defined crystalline body is a distinct step in advance towards precision.

Now, so far as clinical experience goes, sufficient work has been done already to prove that the claims advanced for these two com-

¹ A tannic acid compound of guaiacol is described in the *Therapeutische Monatshefte* for November, 1896. The compound is known in Germany as Tanosol, in France as Creosol.

pounds, at any rate, really hold,—i.e., that they are reliable sources of creosote and guaiacol action, and that they are extremely well borne by the stomach and bowels even when given in large doses. A very limited experience of my own, some eight cases, has entirely borne out Chaumier's original statements as to the tolerance of the drug, and has shown that it may be given in the dose of one drachm by weight, three times daily, not only without exciting alimentary upset, but with an improvement in digestion. Dr. Wessinger (*New York Med. Journ.*, October 5, 1895) gives a similar record, and the drug is reported on favorably by Dr. Dujardin-Beaumetz, Professor Albert Robin, Drs. Greif, Mercer, Torstensson, and others. It is computed that creosotal contains about ninety-two per cent. of available creosote, of guaiacol carbonate about the same, and 91.5 per cent. of pure guaiacol; hence the administration of these preparations enables us to raise the dose of creosote to one hundred and sixty grains and even more *per diem*, and of guaiacol to sixty or even eighty grains in the twenty-four hours. I do not propose, however, to discuss the detailed effects of these two compounds, though the evidence in their favor in cases of tuberculosis and of phthisis is abundant; for my purpose it will suffice that they should be recognized as effective non-irritant vehicles of creosote and guaiacol, and that I should insist again on the high percentage contents of these two active principles.

But recent experience at the City of London Hospital for Chest Diseases calls in question the fears entertained in respect of the irritant action of pure uncombined creosote. Trial upon a large scale has been made in all the wards of the hospital with doses of pure beech-wood creosote (Morson's),¹ which, commencing at five drops, have been rapidly raised to ten, twenty, up to forty, and even sixty drops thrice daily. This practice we owe, I believe, to our senior resident medical officer, Mr. Charles Lamplough, with whom the idea originated, and who has been most energetic and watchful in superintending the cases under the physicians; the results have been most encouraging. The usual mode of administration has been in cod-liver oil; one or two drachms of this have been quite sufficient to convey in solution the dose of creosote, and it has been the general

¹ A specimen of this creosote, kindly tested for me by Mr. Harvey, did not gelatinize with collodion, and gave a specific gravity of 1080.

experience that the oil thus administered is better borne by the stomach. In certain cases, where the administration of oil has been considered inadvisable, or has not been well tolerated by the stomach, the following formula will be found useful; it was drawn up by Dr. Arnold Chaplin, physician to the out-patients at the hospital, with the assistance of the dispenser, Mr. William Harvey:

R Creosoti pur. (beech-wood), ℥ii-xxx;
 Tinct. gent. co., ℥xv;
 Spiritus rectificati, ℥xv;
 Extracti glycyrrhizæ liquidi, ℥ss;
 Aquæ, q. s. ad ℥i. M.

Sig.—From five to forty drops three times a day as directed.

The liquorice employed here is, Mr. Harvey tells me, a solution of stick liquorice, which is more mucilaginous than the liquid extract of liquorice of the British Pharmacopœia, and thus better adapted for emulsifying the creosote. Above the dose of thirty drops the creosote tends to separate out, but on shaking the bottle it is suspended for the time being, and the dose may be satisfactorily poured out and administered. The formula was introduced before the larger doses were employed, but it has proved adequate for these also. The creosote dose, whatever its vehicle, is always administered after meals,—i.e., on a full stomach.

With regard to the rate of increase of the dose, this was made very gradual to begin with, but it was subsequently found that it might be rapidly effected with perfect safety, and the practice which now prevails in the hospital is to increase by five drops every second day. The average maximum dose has been forty drops, which, thrice daily, gives two drachms *per diem*; in a few cases the dose has been raised to one drachm thrice daily.

Under this treatment the patients have done excellently, and notably the appetite, far from suffering, has, in general, improved, sometimes very markedly; together with this there has been a better assimilation and the weight has increased. The fever also has tended to diminish, and sometimes the change from an intermittent pyrexia oscillating through a range of several degrees to a normal temperature has been very striking. The cough has appeared to undergo a decided improvement and the night-sweats have tended to disappear, but on these effects I would dwell less, because, at any rate in my own wards, these symptoms, when prominent, have received

specific treatment with other remedies,—morphia, picrotoxin, etc. I would therefore come back to the alimentary tract as the organ with which we are most concerned, and refer again to the remarkable tolerance shown for these large doses. The term tolerance, indeed, hardly does justice to the case, for the creosote has in many cases seemed positively beneficial, and at times an existing dyspepsia, showing itself even by pain and vomiting after food, has disappeared under full doses of creosote with cod-liver oil. Guttman's estimate that fifteen grains of creosote daily would suffice to charge the blood to an extent adequate to exert a decided control over the growth of the bacilli is on this new dosage exceeded eight to ten times, and accordingly, if this were the mode of action of creosote, the bacilli should be most effectually controlled, if not destroyed; in other words, the drug would be a specific in all tuberculous affections. The course of the cases, however, will not bear this interpretation of the action of creosote, and all that can be claimed for the drug, even in these saturating doses, is that it influences beneficially the course of the disease, enabling the tissues in many cases to make a successful fight against the bacilli. Its apparently beneficial action upon the assimilative processes should here be an important factor.

I have here recorded the experience not of one member of the staff of the Victoria Park Hospital only, but of the physicians generally, and it seems to dispose effectually of the fears of gastric upset which have hitherto restrained the free administration of creosote. It is not suggested that the drug should be given carelessly; its action must in every case be watched carefully, and should it disagree with stomach or intestine, we may then advantageously have recourse to creosotal, guaiacol, guaiacol carbonate, or other derivatives of creosote and guaiacol. Here will be their opportunity, and we must distinctly recognize them as therapeutic advances. But we must not forget that these same derivatives are comparatively costly; thus guaiacol is about three times, creosote carbonate about five times, and guaiacol carbonate some ten times the price of the best creosote, and, after all, they are but vehicles of creosote action: this is a high price to pay for the refinements of the olfactory and gustatory nerves, if this be the whole gain. The conclusion is, try creosote first, keeping its derivatives in reserve for exceptional cases of intolerance of the mother drug.

THE TREATMENT OF EFFUSIONS OF FLUID INTO THE PLEURAL CAVITY BY THE OPERATION OF PARACENTESIS THORACIS.

CLINICAL LECTURE DELIVERED IN THE GLASGOW ROYAL INFIRMARY.

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GENTLEMEN,—As an introduction to our present course of clinical medicine I mean to address you to-day upon the subject of the removal of fluid accumulations from the pleural cavity by the operation of paracentesis thoracis. This mode of relieving empyema was known to Hippocrates, but manifestly it could only have been employed when pointing had occurred. Before the time of Laennec it is obvious that the performance of the operation under any other circumstances was almost, if not quite, impossible. Once, however, we were able by physical examination to ascertain the presence of fluid in the pleural cavity, even in small quantity and under circumstances in which the occurrence of pointing could probably never take place, the possibility of its mechanical removal by puncture was bound to occupy the attention of practical physicians. In the earlier part of this century the operation came to be a recognized procedure in the treatment of pleural effusion, although at first it was viewed with much disfavor. To the labors of Bowditch, in America, of Trousseau and Dieulafoy, in France, and of Gairdner, Begbie, and Clifford Allbutt, in Great Britain, we are indebted for the assured position which the operation of paracentesis thoracis now occupies as a justifiable and safe therapeutic procedure.

The other day some of you saw me examine an elderly man suffering from an extensive pleural effusion, apparently the result of an acute attack of pleurisy which had occurred some six months before. Next morning I removed sixty ounces of clear straw-colored serous fluid from the right side of this patient's chest. As the basis of the

remarks which I am about to offer you upon the operation I shall take this case and the others upon which we have operated during the past two sessions.

During that time there have been treated in my wards thirty-nine cases of pleurisy, either primary or secondary, with evidence of fluid effusion. Of these, twelve required operation for the removal of fluid, serous or purulent, and to the list of hospital cases I add two private ones, making the total operated upon during these two sessions fourteen. Of the cases operated upon, nine were cases of pleurisy with serous effusion; two were cases of malignant disease within the chest, giving rise to secondary pleuritic effusion; three were cases of empyema transferred to my surgical colleague and operated upon by him. Among the cases not operated upon were a number in which the presence of fluid in the pleural cavity was verified by hypodermic puncture. I shall now read to you brief summaries of the cases upon which I have operated, before making any general remarks upon the operative procedure itself.

I. CASES OF PLEURISY WITH SEROUS EFFUSION.

CASE I.—David W., aged seventeen, a plumber, was admitted to Ward 7 on the 9th of November, 1895. Indefinite history of cough and pains in the chest before the 2d of November, on which date rigors and pain in the right side set in, followed by attacks of paroxysmal coughing ending in dyspnoic seizures. Fever moderate, running about 100° F. Signs of considerable right pleural effusion, but respiratory murmur nowhere abolished. On November 10 thirty-six ounces of clear serum were removed by paracentesis, with marked relief to the breathing. Pulse, temperature, and respiration normal from the 17th onward. Slight retraction of right side of the chest first noticed on December 31, 1895. Dismissed January 17, 1896, with well-marked retraction of right side of the chest, but, as regards his general health, well.

CASE II.—Robert D., aged fifteen, an apprenticed mason, was admitted to Ward 7 on the 11th of July, 1896, with pleural effusion of large extent on left side. Dulness behind and below fifth spine, and over the whole left front, but respiratory murmur, though enfeebled, nowhere abolished. Marked displacement of heart to the right side. High fever ranging between 102° and 104° F.; much dyspnoea.

July 14.—Paracentesis in seventh left interspace in line of lower angle of scapula to seventy ounces of clear serum.

July 24.—A second paracentesis of left side to fifteen ounces of clear serum.

August 1.—Evidence of effusion in the right pleura; fever still high; dyspnoea still urgent; general state very grave. Paracentesis of right pleural cavity in sixth interspace in axillary line in recumbent posture; thirty-eight ounces of clear serous fluid removed. Great relief to breathing after third paracentesis.

August 8.—Evidence of pneumonia at both bases, with cough and moderate expectoration containing diplococci.

Slow convalescence: dismissed, greatly improved, September 18. Reported himself October 7, 1896, and again February 25, 1897, in fair general health, but with some dulness and retraction of both bases below level of eighth dorsal spine.

CASE III.—William M., aged twenty-seven, a dock laborer, was admitted August 15, 1896, with well-marked signs of right pleural effusion setting in acutely with pain on August 1. In front dulness below level of second rib, and posteriorly below level of fourth dorsal spine. Respiratory murmur abolished at right base behind. Fever ranging from 101° to 104° F.; pulse, 90 to 100; respirations, 30.

August 19.—Paracentesis to forty-eight ounces of clear serum. From August 22, gradual decline of fever, though not quite to normal; pulse running about 80; respirations from 20 to 24.

September 4.—Dismissed, at his own request, very much improved.

CASE IV.—Patrick C., aged twenty-four, a mason's laborer, was admitted to Ward 7 November 23, 1896. Tolerably abundant pleural effusion of left side setting in acutely with pain and accelerated respiration three weeks before admission. Also cough and spit for some time previous to this. Slight displacement of heart to right. Skodaic note in left infraclavicular region.

November 27.—Dry tapping, the canula probably getting blocked by fibrin.

December 3.—Owing to dulness in front extending and skodaic note disappearing, paracentesis again attempted, and forty-five ounces of clear serum removed with return of resonance in front.

December 22.—Since 7th instant, evidence of reaccumulation of

fluid in left pleural cavity, and so to-day a second tapping, with removal of thirty-five ounces of clear serum.

January 6, 1897.—Moderate hectic fever, with evidence of slight tubercular disease at right apex.

Marked retraction of left side.

Dismissed February 12, and seen again March 8, with evidence still at right apex of phthisis pulmonalis.

CASE V.—Archibald K., aged nineteen, was admitted January 22, 1897. Acute left pleurisy with effusion setting in with a rigor on the 14th instant. On the 25th of January, owing to a rapid increase of the effusion and the disappearance of skodaic note, paracentesis to fifty-six ounces of clear, slightly brownish serum. Speedy convalescence and rapid disappearance of all the signs. Dismissed well March 12, 1897, the temperature, pulse, and respirations having been strictly normal since the 1st of February.

CASE VI.—James E., aged eight, a school-boy, was admitted to Ward 8 on the 17th of February, 1896, with evidence of considerable effusion into right pleura. A week before admission, sudden onset of high fever, with great aggravation of a pain in the right side, of which he had been complaining for a week or two previously. Physical signs characteristic. On February 21, paracentesis to sixteen and a half ounces of clear serum, after which steady but somewhat prolonged convalescence, with disappearance of all the signs. Dismissed well April 24.

CASE VII.—Miss A. B., aged twenty-six, was seen in consultation with Dr. William Little, of Dumbarton, April 8, 1896. Family history distinctly tubercular. In the sputa of one of her sisters I have twice found tubercle bacilli. Patient's health for a year had not been satisfactory. Five weeks before consultation pain in left shoulder, followed by progressive dyspnœa, forcing her to take to bed upon the day I saw her with Dr. Little. Signs of marked left pleural effusion with displacement of heart to right. Advised paracentesis. Not consented to at first, but a week afterwards Dr. Little withdrew sixty ounces of clear serum. I saw her a month later doing well, and since then she has been keeping in fair health.

CASE VIII.—Mrs. McL., aged thirty-five, a housewife, was admitted to Ward 8 on the 20th of July, 1897, suffering from anæmia, debility, fever, and sweating, following upon a confinement of twins two months before admission, without a history of special difficulty

or hemorrhage at the time of delivery. At the time of admission signs of moderate effusion into left pleural cavity, preceded for a day or two by pain in the left side. The temperature was suggestive of septicæmia, and it was thought that the effusion into the left pleural might be purulent. On July 29, owing to signs of great increase in the amount of pleural effusion, paracentesis was performed, and seventy ounces of clear serum were removed, with no trace of pus. This patient had other symptoms apart from the pleurisy which were regarded as originating in septic absorption; but she made a very good recovery as regards the pleural condition, and she was dismissed in fair health upon the 24th of September, 1897.

CASE IX.—James McC., aged sixty, a weaver, was admitted to Ward 7 on the 4th of October, 1897, suffering from right pleural effusion of considerable amount, with a sense of weakness or oppression in the right side and very urgent dyspnoea on any exertion. He suffered about five months before admission from an attack of acute pleurisy, which had followed upon an attack of influenza some weeks before. There was dulness over the whole lower half of the right back and to the level of the third cartilage in front, but the respiratory murmur was not abolished. On October 7, paracentesis of right side and sixty ounces of perfectly clear serum removed, with great relief to the breathing. A number of you saw me operate upon this case, and to-day you observe that he is progressing very favorably in all respects.

II. CASES OF MALIGNANT DISEASE WITHIN THE CHEST ASSOCIATED WITH PLEURAL EFFUSION.

Under this heading I have had, in the time covered by the cases reported in this lecture, two illustrations. One was a man, aged forty-four, upon whose right pleura I operated twice, removing on the first occasion thirty-five ounces of clear serum, and on the second sixty-five ounces of purulent serum. The operation afforded marked temporary relief and prolonged his life.

The second was that of a lady, aged thirty-five, whom I saw on two occasions with Dr. James Craig, of Dennistoun. On the first occasion I removed sixty ounces, and on the second, two months later, I withdrew forty-five ounces of deeply blood-stained serous fluid. I have no doubt that the operations greatly prolonged this patient's life; and the hemorrhagic nature of the fluid as well as a

number of enlarged glands confirmed our diagnosis of intrathoracic malignant disease.

III. CASES OF EMPYEMA.

I need not detail the clinical features of the three cases of empyema included in the list given in this lecture, as when the fluid was found to be pus I at once stopped evacuating it, and transferred the patients to the surgical wards, where they were operated upon. Two of the three made good recoveries from the operation; the third, a baby aged fourteen months, died.

These cases which I have thus very briefly epitomized from our ward journals, in which you will find full details, along with a number of others in which I had previously been concerned, either as principal or assistant, form a certain basis of experience upon which I may now proceed to offer to you a few remarks on the operation itself.

Method of Operating.—I always employ the medium-sized trocar and canula supplied with Potain's aspirator, but never the aspirator itself, as I find that I can get sufficient fluid to drain away without using suction. To the outlet of the canula I fix a long india-rubber tube, which bears the fluid to a vessel at the bedside. I prefer the patient to be in the sitting posture, leaning slightly forward, and, if convenient, with his elbows resting on a table. The night before the operation my nurses thoroughly cleanse the skin of the chest and apply an antiseptic dressing. The instrument and the tubes are boiled and kept in a 1 : 40 carbolic lotion till they are to be used. I prefer to operate in the line of the lower angle of the scapula in the seventh or eighth interspace. I use no anæsthetic, either general or local, but I warn the patient that I am going to cause him momentary stabbing pain, and tell him immediately before I am going to puncture. With the point of my left forefinger I mark the point selected, pressing it firmly into the interspace, and only raising it when I am ready to plunge in the trocar, which should, if possible, be driven into the pleura with one thrust. I hold the instrument with its head resting against the middle of my palm, and my forefinger at an inch from the point. The difficulty is to anticipate the involuntary jerk which the patient gives to his chest as he feels the point penetrating the skin. If one does not succeed in this, he either hits a rib or has the point of his instrument caught between two closely applied ribs. If this happens, it is, I think, better not to

withdraw the instrument, but rather by a slight to-and-fro movement of the point to get it home by a second thrust. If a flow does not come at once, the blunt-pointed probe may be pushed through the canula, when fluid usually comes. After the canula is *in situ* I have never found patients object or complain of pain. By a canula of the size I have indicated at least half an hour is necessary to withdraw fifty or sixty ounces of fluid. I never attempt to remove the whole of the fluid, and I withdraw the canula upon the following indications manifesting themselves: (1) persistent stoppage of the flow; (2) persistent uncontrollable coughing; (3) supervention of acute dragging pain; (4) feelings of faintness or dyspnoea. If it is dangerous for the patient to be moved, or to sit up, I operate in the recumbent posture. I think there is practically no danger of air entering the pleura in this method of operating. At least, it has not so far happened to me, and if it did I do not think that a large quantity could get in, or that it would do much harm.

IV. CLASS OF CASES SUITABLE FOR TREATMENT BY PARACENTESIS THORACIS.

I preface what I have to say on this point by the remark that all cases are suitable in which the mechanical effect of the fluid present is such as immediately to endanger life by suffocation. If, however, we classify our cases, according to a pathological basis, into suitable and unsuitable, I would say that *suitable* cases are (1) pleurisy with effusion, acute or chronic; (2) cases of pleural effusion, due to malignant disease in the lung or mediastinum, the operation being a palliative measure merely. *Unsuitable* cases are (1) empyema: if pus is obtained the operation should at once be discontinued and the case passed on to the surgeon, for, as Clifford Allbutt has pointed out, the removal of pus through the needle is likely to be followed by symptoms of septic absorption; (2) effusion due to renal disease; (3) effusion due to cardiac disease. This classification, however, is entirely subject to my prefatory remark at the beginning of this paragraph. Attempts to estimate from the physical signs the actual quantity of fluid present are not in my opinion very satisfactory, nor are such estimations of great clinical importance.

INDICATIONS FOR PARACENTESIS THORACIS.

The chief indications are dyspnoea and physical signs pointing to a large and rapidly increasing effusion. The presence of fever

is no contraindication. With Dieulafoy, we may agree that cases raising the question of paracentesis may be grouped into two classes, —(1) *urgent* cases, and (2) *debatable* cases. With the former we must proceed to operate at once; with the latter we may delay and perhaps try other means first. The indications of urgency may be briefly stated as these: (1) displacement downward of the diaphragm; (2) the presence of fine moist râles in the opposite lung; (3) the supervention of cardiac murmurs from displacement of the heart; and (4) above all, the existence of urgent dyspnoea. Debatable cases are those in which none of the signs of urgency are present. In these we may delay operation in order to permit of a trial of other methods; but it must never be forgotten that too long delay may result in the formation of adhesions which will prevent the expansion of the lung. On the whole, I think the removal of fluid by paracentesis is preferable to its more slow dispersion by blisters and other local applications.

It is also to be remembered that there are many cases in which nature, assisted by medical art, may rapidly remove even a large effusion without resort to puncture, but experience alone enables us to recognize such cases and so to deal with them appropriately.

RESULTS AND DANGERS OF THE OPERATION.

As regards the results of the operation, in cases of pleurisy with a serous effusion, I must say that my experience has been very favorable. Removal of the fluid in this way, in my opinion, hastens the recovery. It does not, however, always prevent a decided retraction of the affected side of the chest from taking place, especially when the fluid has been effused for several weeks before the operation is performed. I much prefer this method of treatment to that by blistering. In only one of my cases have I had experience of a profuse serous expectoration following the operation. This occurred in one case and lasted for twenty-four hours, but did not apparently do the patient any harm. I do not think that a puncture of the lung with a trocar and canula of the size I use would be followed by much injury to the patient. It was once my experience, probably (though not certainly, as the lung may have been punctured) from the trocar having been accidentally attached to the wrong tube of the aspirator, to produce an extensive subcutaneous emphysema, developing while the needle was *in situ*. I was greatly distressed, but the emphy-

sematous condition slowly disappeared, leaving the patient nothing the worse; and the fluid in his pleura, which had been proved by exploratory puncture beforehand, also slowly disappeared. I have not used an aspirator since.

In cardiac and renal hydrothorax I would prefer not to operate unless there were some very special indication, such as dyspnoea, because in such cases reaccumulation is almost certain to follow, and the cases are, on the whole, best dealt with by medical means.

One warning in conclusion. Never, in acute extensive pleuritic effusion, with great dyspnoea on any exertion, hesitate to perform paracentesis immediately. Once in the earlier years of my practice I was called by a medical friend to see such a case. We discussed the operation and determined to delay it till the following morning, and the patient died suddenly in the night. This case I never forgot. I do not say that we would have saved the patient's life, but we would at least have given him a chance. The physical signs were those of the largest pleural effusion I have ever seen; as he lay in bed there was no apparent dyspnoea; we forgot, however, that a sudden movement or a fit of coughing might prove fatal; and so, indeed, it happened. Remember, however, that in such a case the risk of syncope during the operation is considerable, and to be forewarned is to be forearmed on this point.

POISONS AND THEIR TREATMENT.

BY HERMAN D. MARCUS, M.D.,

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THERE is no condition which presents itself to the active practitioner and demands more prompt attention than that of acute poisoning. The tendency of the family surrounding the sufferer is one of great confusion; alarm is depicted on every one's face, and only very seldom can a physician call on any one of the immediate family for actual assistance. In the face of such a state, it is he upon whom all moral responsibility rests, and not only must he show coolness and promptitude, but also a knowledge of poisons and treatment so complete that actually without thinking, but as a matter of routine, the proper care-taking of the patient presents itself to him.

Not only his duty to the patient and his family, but his duty to the community at large, demands a careful study and investigation of all facts presenting themselves in conjunction with that particular case, and he is forced, so to speak, to not only act the rôle of physician but as well that of an officer of the law.

Cases of poisoning are unfortunately common occurrences, and while it does not fall to the lot of the average practitioner to deal with a great number of them, it is not so much due to the very small number, but more to the fact that such cases are most generally hurried to a hospital to receive proper treatment.

Taking a case to which you may be called, and in which the poison is unknown, it will be found to the interest of both patient and physician to clear the room of all persons who cannot be of actual help to you. It is usually a very difficult matter, in a case of life or death, to order the immediate members of the family out of the room, but a little tact will achieve this end without actually saying that their presence is not required. There is no time to go into any discussion and explain the why and wherefore a large number of persons in the room are of no benefit, and, in fact, of

great harm, interfering with the physician and doing harm to the patient. A very favorite method of getting rid of outsiders is one of getting each and every one occupied. For example, sending one for mustard to the drug-store, another one to prepare hot water, some one to get a pan, and a thousand and one other subterfuges which, while impressing the different members with the importance of their own selves in assisting you, at the same time achieves the important end of getting rid of them. With the room cleared of everybody except the patient and one or two male members who can be of some assistance to you, it is your next duty to diagnose, if possible, the poison taken. The patient's appearance, as, for example, in taking of a corrosive poison; the burn on the lips, chin, and neck where the poison may have been spilled; a bottle which has apparently contained poison, are all ways of finding out quickly the possible cause of the condition. If you see that a patient has taken a corrosive poison, recognized by the softened, corroded condition of the tissues, you must also recognize that the condition of affairs is prevalent internally,—namely, that the œsophagus, and, in fact, the entire digestive canal and stomach, are in an equally softened, corroded condition, and, as a result, it is of great importance that the parts shall not be disturbed, for fear of causing a sudden rupture of one of the blood-vessels exposed and corroded by the action of the poison; consequently emetics are contraindicated, and the stomach-tube should be passed only by a man who is well versed and experienced in the use of this instrument. The first treatment of a poison, non-corrosive in character, is to be directed chiefly to three points,—namely, the removal of any poison which may possibly be still present in the stomach; secondly, counteracting the effect of the poison; thirdly, stimulating the patient to overcome the shock. To remove any poison in the stomach we use emetics. We can classify emetics as of two kinds,—namely, direct or local emetics, and systemic or general emetics. In the class of direct emetics, meaning such emetics which cause vomiting by irritating the terminal filaments of the gastric nerves, we place mustard, sulphate of copper, sulphate of zinc, alum, and the subsulphate of mercury. Systemic emetics, or those which act by exciting nervous centres, are apomorphine, ipecacuanha, and tartar emetic.

Emetics when given in cases of poisoning should be continued until their physiological effect is produced, and the emetic dose of each drug is repeated *ad infinitum*. Thus, for example, the sul-

phate of copper may be given in doses of from three to ten grains; the sulphate of zinc, in doses of from ten to thirty grains; mustard in solution is given *ad libitum*, and alum may be given in doses of from thirty grains to one drachm; the subsulphate of mercury, from three to five grains; apomorphine hypodermically, in doses of from one-sixth to one-tenth of a grain; ipecacuanha, twenty grains of the powder, or one to two teaspoonfuls of the syrup; and tartar emetic, from one-eighth to one-half of a grain. All these drugs are valuable, and their action can be considerably hurried by giving a cup of hot water, thereby furthering emesis. The stomach-pump can also be used, but as this instrument is not usually found in the office of every practitioner, an instrument very similar in its action can be improvised by using a piece of long rubber tubing and passing this down into the stomach and pouring into the tube through a funnel the solution indicated, and removing it with the contents of the stomach by permitting this tube to act as a siphon. A very important point in the use of this tube is a thorough knowledge of the regional anatomy of the digestive tract. The tube, before passing, should be well greased and placed upon the back of the tongue, where an act of deglutition will engage the tube in the œsophagus, and then it can be passed with ease. A very good way to introduce a stomach-tube is through the nostril, and practice in that direction is recommended, as you may meet cases in which it is impossible to pass the tube through the oral cavity, either owing to the rigidity of the temporal and masseter muscles, to closing the teeth tightly, or to contractions caused by corrosive poisoning. The passing of the tube through the nostril is, if anything, much easier than through the mouth.

If the poison is unknown and emesis has been produced, of course nothing remains but to treat the symptoms,—namely, the labored respiration, the depressed heart, and collapse, which must be treated separately without any regard to the fact that a poison is the cause of the condition. Dr. Murrell, one of the greatest authorities on this subject, recommends the administration of a universal antidote in cases of poisoning from an unknown agent,—namely:

R Liquor ferri sulphatis (sat.), ʒi;
Aque, ʒi;
Magnesiæ, grs. lii;
Carbo. animalis purificat., grs. xxiv. M.
Sig.—As directed.

"The iron solution should be kept separate from the other ingredients and only mixed when wanted. The dose is one wineglassful often repeated, and should be taken while the insoluble ingredients are in a state of suspension." In collapse or shock, any of the vascular stimulants, such as ether, alcohol, ammonia, strychnine, caffeine, or nitroglycerin, can be used. For the pain, hypodermic injections of morphine, and for disturbance of respiration, atropine and strychnine, besides the usual quiet and rest, if not contraindicated by some special symptom peculiar to any particular form of poison. It is of the greatest importance for the physician promptly to inquire, by questioning or by investigation of the surroundings, the nature of the poison taken.

It would be impossible to begin to enumerate and speak of all drugs which, when taken internally, produce toxic symptoms. As it is only my purpose now to speak of the most common drugs usually taken with suicidal intent, accidentally, or given for criminal purposes, I will classify these poisons into corrosive and non-corrosive poisons, gases or vapors.

In the class of corrosive poisons we will place the mineral acids, alkalies, carbolic acid, and mineral salts. In the treatment of mineral-acid poisoning the appearance of the patient will be a guide to the acid taken,—namely, in sulphuric acid the mouth, lips, or any part with which the acid comes in contact, are blackened, and the vomit is of the same color. In nitric acid the tissues are yellowish in color and the vomit brown. In hydrochloric acid the color of the eschar is white, the vomit dark yellow. A very prominent symptom associated with acid-poisoning is inability to talk, the peculiar drawn, haggard appearance of the face, the intense burning pain in the throat, in the digestive tract, and in the epigastrium, the cold, clammy skin, the small, weak pulse, violent retching and vomiting,—in short, all the signs of shock, prostration, and collapse. The treatment consists of the administration of flour in solution, large quantities of milk, white of eggs, magnesia,—chalk, tooth-powder, soap, or the plaster of the wall making quite a good substitute if none of the other remedies are at hand,—stimulants of course, quiet, and heat. Emetics must be avoided, owing to the danger of causing a rupture of the stomach. Carbonates are contraindicated for fear of forming carbonic acid gas, and thus causing destruction of the stomach. The stomach-tube, if used at all, should be used with the

greatest of care, and only then if vomiting does not occur spontaneously. The danger of the vomit being drawn into the air-passages, and there causing destruction of the tissues, must be avoided.

If the retching be too severe, this can be overcome by the giving of small pieces of ice, or, if necessary, hypodermic injections of morphine may be given. For the pain the same drug can be given. Of course, after the patient recovers from the acute effects, the dangers resulting from the destruction of the tissues, such as the œsophagus, or violent gastritis, must be treated.

The symptoms of alkali-poisoning are very similar to those of acid-poisoning, and the treatment is, in the main, the same, with the exception that, instead of alkalies being administered as antidotes, acids must be used. You will use dilute mineral acids. As demulcents use milk, white of eggs, and water. Vascular stimulants, morphine, and atropine must be given as required.

Poisoning by carbolic acid is recognized by the intense burning of the lips, mouth, throat, and digestive tract. Lips and mouth show *hardened* and *white* patches from the local action of the poison. Pain in the epigastrium is a prominent symptom, the urine is very dark, at times black, the skin cold and clammy, pulse small and rapid, the respirations slow and deep, but towards the end shallow and hurried. Unconsciousness and collapse appear quickly.

In the treatment of this poison emetics and oils should be avoided,—oil especially favoring rapid absorption. The stomach-tube may be used, but with the greatest care. Solutions of sulphates, such as Epsom or Glauber's salt, should be given in large quantities. Albumen in the form of white of eggs and flour are both indicated. Shock and collapse must be treated as usual, morphine especially being of value.

In the group of vegetable acids we place oxalic, tartaric, and acetic acid. The symptoms and treatment are similar to that observed in mineral acid poisoning.

In conjunction with the symptoms and treatment of mineral-acid poisoning it may be well to consider vitriol or sulphuric acid throwing. The symptoms are those naturally expected from the effect of large quantities of acids on the tissues. The treatment consists in wiping as much of the acid away as possible, tearing all clothes, saturated with the acid, from the body. The face and parts affected are then bathed freely with water containing large quantities

of baking soda, using soap freely. For the eyes we will use solutions of bicarbonate of soda, five grains to one ounce of water, and syringing the eyes thoroughly, and following this instilling a few drops of castor or olive oil. Keep the patient quiet and in a darkened room and treat the resulting shock.

Corrosive sublimate poisoning is recognized by the severe pain in the stomach, vomiting of a glairy fluid, griping, purging, stools being mucous in character and streaked with blood. Lips, tongue, and mouth are white and swollen. The pulse is small, thread-like, rapid and irregular. Urine is suppressed. Convulsions may appear just before death, but intelligence usually remains intact to the last. The treatment consists of emetics cautiously administered, albumen, flour, barley-water, vascular stimulants, external heat, rest, and quiet.

Arsenical poisoning is very frequent, and may be due to taking the poisoning with suicidal intention or accidentally through the medium of wall-paper, colored chalks or crayons, fly-paper, etc., all of which frequently contain large quantities of this poison.

Persons poisoned with arsenic show symptoms slowly, these usually not appearing for from fifteen to sixty minutes, and for this reason prompt measures can be constituted with considerable success. At first faintness, vertigo, and depression are noticed, which in turn are followed by severe burning pain in the epigastrium, nausea, and vomiting of a brown liquid mixed with blood and mucus. Purging is at first very liquid, later streaked with blood, and resembles choleraic movements. The pulse is small and feeble, the skin cold and clammy, the temperature subnormal, and respirations shallow, all indications of severe shock. The treatment consists of the administration of any of the sequioxides of iron, preferably the *freshly* precipitated ferrum oxidum hydratum (U. S. P.) (prepared by the addition of an excess of ammonia to a solution of sulphate of iron and then washed and strained). The dose should be about twenty grains to each grain of arsenic, or if the quantity of arsenic cannot be approximated, then the antidote should be given in tablespoonful doses. Magnesia and animal charcoal are also indicated. Albumen, barley-water, and linseed tea may be administered. The treatment for shock and hypodermic injections of morphine or linseed-meal poultices to the abdomen for pain must be given if indicated.

Poisoning by salts of lead are quite frequent, and may be recognized by the dry throat, metallic taste in the mouth, great thirst, and intestinal colic. Other symptoms are constipation, cramps in the lower extremities, cold sweats, and convulsions. The treatment consists of the administration of emetics, the use of the stomach-tube, sulphuric acid lemonade, Epsom or Glauber's salt, albumen, milk and barley-water, stimulants for shock, and morphine for pain.

Phosphorus-poisoning shows symptoms such as pain and burning in the stomach with vomiting and purging. Both vomit and fæces may be phosphorescent. There may be epistaxis and bloody vomiting and stools. In women sanguineous discharge from the uterus has been observed. The treatment indicated is the administration of emetics, followed by Epsom salts and the antidote, the *French* oil of turpentine. No oils or fat should be given.

Turpentine is taken frequently by mistake, and is readily recognized by the odor on the breath. The pupils become contracted, the breathing stertorous. Convulsions, collapse, and coma may appear. Strangury is frequent, and associated with bloody urine with a violet odor. Treatment consists of emetics and the stomach-tube, Epsom salts, demulcent drinks, and albumen. Shock and pain should be counteracted by proper medication.

In aconite-poisoning we observe the following symptoms: warmth in epigastrium, tingling of mouth, lips, and tongue, frequent swallowing, numbness at tips of fingers, nausea and frequently vomiting, slow, weak, and irregular pulse, and feeble respirations, exceedingly great prostration, but patient remains conscious to the last. The slightest exertion will cause death. Emetics and the stomach-tube are indicated, but emetics prove valueless owing to the effect of the drug on the nerve-endings. Tannic acid, alcohol, and ammonia should be administered. Digitalis and strophanthus are the physiological antidotes, and atropine may be likewise given. All these drugs by hypodermic injections. Artificial respiration and treatment for shock should be employed. *Patient should be kept in the recumbent position to avoid shock.*

Digitalis-poisoning may be recognized by the peculiar grass-green vomit, the slow, feeble, and irregular pulse, headache, delirium, convulsions, and severe headache. All the symptoms of severe shock are present. The treatment is somewhat similar to aconite. Emetics must be used freely. Tannic acid, alcohol, and

vascular stimulants should be employed, and *the patient kept in the recumbent position.*

Strychnine-poisoning, or the toxic effect of *nux vomica*, may be diagnosed by the peculiar tetanic spasms and convulsions, especially the rigid conditions of the muscles of the neck. Later the muscles of the chest and diaphragm become tetanized, causing difficult breathing. *Risus sardonius* and lockjaw are frequently observed. Pulse is rapid and feeble. Stomach should be emptied by emetics or stomach-tube; animal charcoal and tannic acid in the form of hot coffee or tea should be freely given. The tube should be used with caution, as its introduction may cause convulsions. For these chloroform or nitrite of amyl inhalations may be given, even anæsthetizing the patient completely. Chloral, bromides, and opium may be prescribed. Paraldehyde is a reliable antidote, especially if given in conjunction with intravenous injection of an eight-per-cent. soda solution, as recommended by Sanguirico. The catheter should be freely used and purgatives administered.

The toxic effect of belladonna or atropine is readily recognized by the excessive dryness of all mucous membranes, especially the mouth and throat, great thirst and difficulty in swallowing. The flushed face and widely dilated pupils are diagnostic of poisoning from these drugs. The eyes are prominent and sparkling. A very prominent symptom is the great excitement present and the noisy and even maniacal delirium. The gait is staggering. Treatment consists of evacuation of the stomach. Tannic acid and stimulants must be given freely. Morphine is the physiological antidote, and should be given until the pupils *begin* to contract, and not till they are well contracted. Pilocarpine has been given subcutaneously with success. Artificial respiration should be maintained, and catheterization may be indicated.

Opium-poisoning is one of the most frequent forms of poisoning you will meet, the ease with which this drug can be obtained making it one of the most popular drugs of the suicide. Accidental poisoning from this drug is also frequent. The symptoms at first observed are usually some excitement, quickly followed by drowsiness and deep sleep resembling coma; flushing of the face; strong and bounding pulse at first, but towards the end becoming weak and irregular; respirations at first slow and stertorous soon become slow and feeble; skin usually cold and clammy, although it may be at first dry and

warm. The pupils are pin-point in character, but will dilate suddenly before death. The coma is very deep, and the patient can be aroused only with the greatest difficulty, if at all. The treatment consists of the administration of tannates, emetics, stomach-tube, and the physiological antidote, belladonna. Stimulants to improve both respiration and circulation, such as strychnine, nitroglycerin, atropine, and ammonia, should be given. *Keep the patient awake* by walking him *continually* about, slapping, and rubbing him with towels rung out in cold water. Galvanization and artificial respiration may become necessary. Permanganate of potassium is a valuable antidote, and should be given in amounts equal to the amount of the poison taken. Do not stop your efforts too soon, but continue them until the patient has either recovered or is unquestionably dead. Alcohol is contraindicated owing to its stupefying effect in fair doses.

After this general review of the symptoms and treatment of the more common forms of poisoning, I want only to recapitulate a few important points.

1. Act promptly.
2. Always use the antidote nearest at hand, even if better antidotes can be obtained at the expense of time.
3. Confiscate, if a suspicious case (homicidal), vomit, fæces, urine, empty or full bottles in the room.
4. Do not commit yourself; you may be called upon to testify in court, and incautious remarks may come back to you.
5. Do not voice suspicions, if you have any.
6. Get history of case if you can, but work meanwhile. Do not sit down to listen.
7. Ask questions to the point, and do not encourage a recital of family affairs.
8. Get rid of all excited relations or friends.
9. Be firm but polite.
10. Do not get excited yourself.

THE TREATMENT OF SECONDARY SYPHILIS.

CLINICAL LECTURE DELIVERED AT THE HOSPITAL COLLEGE OF MEDICINE.

BY JOHN E. HAYS, M.D.,

Professor of Dermatology, etc., in the Hospital College of Medicine, Louisville,
Kentucky.

GENTLEMEN,—The first case we will show you to-day is Mrs. R., aged twenty years, who comes to us complaining of the following symptoms, which are given in her own language: Sore throat; eruption on the chest and arms, which has existed four or five months; gums sore; tongue contains several blisters; she has had one miscarriage, and her menstruation is scanty. She tells us that she has been married one year, and that she was perfectly well before her marriage. Within the last few months she has lost several pounds in weight,—ten or twelve, she states. She claims never to have had a sore of any description about the genitals. On superficial examination we find the post-cervical glands enlarged, as are also some other glands about the neck.

The symptoms which this lady presents are unmistakably those of syphilis, probably innocently contracted from her husband. She gives a history of having been perfectly well up to the time of marriage; a few months thereafter she began to complain. The first symptoms are rather negative, as she gives no history of a sore about the genitals; it is probable, however, that a sore existed and was entirely overlooked, which is not uncommon in the female. A chancre, located on the labia, as a rule, gives rise to little inconvenience, little pain, or possibly none. She undoubtedly has well-marked secondary symptoms of syphilis,—a typical eruption on the skin of the chest and arms, a diseased condition of the fauces, superficial ulceration of the soft palate; also some ulceration along the sides and on the dorsal surface of the tongue, enlargement of the glands at the back of the neck, falling out of the hair, etc. She also

gives us the history of a miscarriage, which is usual in a woman suffering with syphilis. She says she has never given birth to a child. Syphilitic women will usually not carry a child to full term, but will abort commonly at the second or third month.

I do not know that she is aware of the nature of her trouble, and probably it is better to allow her to remain in ignorance. At the same time it is imperative that she begin treatment as soon as possible and continue it until the poison has been completely eradicated from her system.

On previous occasions I have dwelt at considerable length upon the diagnosis of syphilis, and the various manifestations which result from the syphilitic poison circulating in the blood, and have told you that the disease is due to a micro-organism, although the organism has not yet been definitely isolated. Still, we are reasonably sure that the disease is microbic in its origin. Therefore, in this lecture I shall not dwell upon the diagnosis nor the manifold manifestations which the disease may present, but will speak for a few minutes upon the treatment of syphilis.

Of course, the treatment which this lady most needs is constitutional medication. Now, the constitutional treatment is one which should be commenced as early as you can make a positive diagnosis of the disease. It has generally been considered unwise to begin the treatment of syphilis until constitutional manifestations have developed,—i.e., the secondary symptoms,—but I am rather a strong believer in beginning internal constitutional treatment as early as you can make a positive diagnosis. I think we can be in no doubt in many instances of the nature of the trouble even before secondary manifestations develop. If the patient be put under treatment early, as soon as you can positively diagnose the primary sore, you can to a great extent limit the secondary manifestations and bring about a cure earlier than if you wait until two or three months later before you institute treatment.

As regards remedies for the relief of syphilis, I hold there are but two upon which we are to place any reliance,—viz, mercury and iodide of potassium. Of these two, mercury is the one upon which chief reliance should be placed. Especially is this true in the primary and secondary stages of the disease, or at least in the primary and early period of the secondary process. In the latter part of the secondary stage, and also in the tertiary stage, iodide of

potassium is the remedy which is most useful. Mercury, when appropriately administered, is not likely to injure your patient in any way; on the contrary, and this is a great argument in favor of its use, a patient with syphilis who receives mercury in appropriate manner is undoubtedly benefited in general health, not to speak of the eradication of the syphilitic poison from the system.

Any preparation of mercury which can be given internally can be used in the treatment of syphilis, and the preparations are numerous. I will simply mention some of them which can be used in the internal treatment of disease: We may use calomel, the blue pill, mercury with chalk, the bichloride, protiodide, biniodide, etc. These are probably the forms most generally employed. Each physician will have his choice, not only as to the particular preparation of mercury, but also as to the mode of its administration. Mercury can be given in different ways, but its usual employment is by the mouth. It can be used by fumigation, by inunction, or by hypodermic injection. Its usual administration, however, as already stated, is by the stomach. We should aim to employ that preparation of mercury which is least liable to derange the intestinal tract. We find that some preparations of mercury are more irritating to the gastric apparatus than others. For my own part, I have a decided preference to the bichloride; probably in nine out of ten cases I will employ this in preference to the other preparations of mercury, as I find I can control the disease much better with this preparation and with less disagreeable effects to the patient. In giving mercury internally, where I think there is any danger of producing intestinal irritation, I generally administer it in solution, instructing the patient to dilute it largely with water. It is said that by diluting the mercury with a large quantity of water the irritating effects of the drug can be completely overcome. Of course, the bichloride can be given in the form of a pill, or in the tablet triturate form; the size of the dose will vary according to the peculiarities of your patient. An average dose for a strong, muscular adult should be one-sixteenth of a grain, and this can be increased to one-twelfth or one-eighth of a grain. On the other hand, in a delicate individual, especially a female, where the digestive function is feeble, a smaller dose probably produces a better effect. In such a case I usually give one-twentieth, one twenty-fourth, or one-thirty-second of a grain. I seldom give smaller doses than one-thirty-second of a grain in adult

cases, which should be repeated three times a day, preferably after meals.

Of the other preparations, the protiodide is perhaps the most frequently employed, and the dose varies from one-sixth to one-half of a grain three times a day. It is usually given in pill form or in the form of the tablet triturate. This form of mercury is often used, and is held in high esteem by many authorities. However, I have found it more irritating to the digestive tract than the bichloride and consequently seldom employ it.

One of the methods of internal treatment which has for a long time been a favorite is that of inunction. In this way the remedy can be introduced into the system without producing any of the disagreeable gastro-intestinal symptoms which sometimes follow the administration of mercury by the mouth. The objection to this method is that it is uncleanly, and often your patient will not carry out the treatment with that degree of minuteness and detail which should always be observed. In the use of mercury by inunction we ordinarily employ that preparation known as blue ointment,—*unguentum hydrargyrum*. The amount to be used each day varies from one-half to one drachm; the usual amount is from thirty to forty grains. That amount corresponds to a piece of blue ointment about the size of the terminal joint of the index finger. It is unnecessary to weigh it, but tell your patient to use a piece that will correspond in size to the terminal joint of his index finger. In applying mercury by inunction you are to select that portion of the skin where the integument is thin; consequently the parts to be thought of in this connection are the inner aspect of the thighs, lower part of the abdomen, inner aspect of the arms,—the chest may also be used,—and you are to change about as to location. If you apply the remedy to the inner aspect of one thigh the first day, the second day the opposite thigh should be used, the third day the lower part of the abdomen, the fourth day the inner aspect of one arm, the fifth day the inner aspect of the opposite arm, the sixth day the chest, in this way changing about from one locality to another in order to avoid the irritating effects of the drug. The ointment should be used with considerable friction, which must be continued for ten or twelve minutes. After you get through the rubbing process, you are not to wipe off the surface, but allow the mercury to remain in contact with the skin, the underclothing to be replaced over the part, so that the

drug may still further be absorbed during the day. You will find patients can be brought under the influence of mercury by inunction very rapidly, and this plan is to be recommended in patients whose gastro-intestinal tract is easily upset by the remedy administered by the stomach. In the use of this method you should also guard against pushing it too far; you should never push the remedy to the point of salivation, but stop short of this point. Salivation is always indicated by soreness of the gums, increased flow of saliva, fetid breath, and gastro-intestinal pains. The remedy should not be pushed to this stage.

Another method of administering mercury is by fumigation. This is not much resorted to nowadays, although it is regarded by some authorities as a typical way of introducing mercury into the system. The preparation employed in fumigation is calomel, and for this purpose no especial apparatus is necessary. You can simply take a bowl containing a small amount of water which has reached the boiling-point and place therein an ordinary brick which has been heated as hot as possible. Place the brick in the water so as not to have it entirely covered; on this brick place a half-teaspoonful to a teaspoonful of calomel; then place your patient over this by putting the bowl under an open chair,—one with a perforated cane bottom will answer; the vapor which comes up from the water will carry with it the calomel, which is deposited upon different parts of the body. Of course, in carrying out this plan the patient should be naked, with simply a blanket thrown over him, in order to allow the fumes to have free access to all parts of the body. After the calomel has been vaporized and is deposited upon different parts of the body, the patient can throw off the blanket and put on his clothing, taking care not to go out in the air until he has become thoroughly cooled.

Another method of administration of mercury is by hypodermic injection, which was brought into prominence with the profession by some German authority, I think, about ten years ago. A great many articles have been written upon the use of mercury in the treatment of syphilis by this plan. It has been claimed that the disease can be more speedily controlled by the use of the remedy in this way than in any other. But after repeated trials and observations it was found that the remedy was no more efficacious when introduced by this than by the older plans of treatment. Not only that, but this plan has serious disadvantages: the injection of mercury

into and beneath the skin has been attended by inflammation which has frequently resulted in suppuration. These hypodermic injections produce abscesses not infrequently. The drug usually employed for hypodermic use was the bichloride, although some insoluble preparations of mercury were also used with some bland oils. But the drug which was most commonly used was the bichloride. One formula used in this plan is to take fifteen grains of the bichloride of mercury, thirty grains of chloride of sodium, and three ounces of distilled water, which makes a clear solution. Of this, take fifteen minims and inject it under the skin, to be repeated every other day. The quantity of mercury used in this injection is probably one-sixth to one-eighth of a grain. I have not had any personal experience with the hypodermic use of the drug, for the reason that it is a difficult measure to be carried out in private practice; the patient has to come to you for every application of the remedy, and, as before stated, it is attended with considerable pain, and frequently with the formation of abscesses.

The chief reliance upon mercury is by its administration by the old method,—viz., by the mouth, using one of the preparations already mentioned and pushing it to the extent just short of salivation and purgation. As already indicated, it has been found that mercury properly given does not in any way interfere with or impair the patient's general health; on the contrary, while using the drug the patient will time and again tell you that he feels very much improved, not only in health but in spirits; it seems to relieve the patient of the depression which not infrequently accompanies the trouble.

Now, as to the time which mercury should be administered: I believe for the first six or nine months the remedy should be used day after day without any intermission unless evidences of salivation supervene. After the cutaneous symptoms have subsided and the patient shows no external evidences of the disease, you can use the drug in an intermittent manner; particularly is this the case after the first year of steady treatment. My own plan has been to give the drug for a period of three weeks, then allow the patient to rest for a week or ten days, keeping up this intermittent treatment for six, nine, or twelve months after all secondary manifestations disappear.

If patients are not seen in the early stages of syphilis, or if they do not receive appropriate treatment of a constitutional nature for a

time, you will frequently see the occurrence of the so-called tertiary symptoms, which are very different from those seen in the primary or secondary stages. You will find in the tertiary stage that the disease affects deeper structures. In the secondary stage you will find the superficial structures involved, but in the later stage you have involvement of deeper tissue, and then you are treating, in my opinion, not so much the syphilis itself as some of the results or sequelæ of the disease. At this stage of the disease the blood and the secretions from the glands, etc., seem to have lost their power of infecting other persons. In this stage of the disease iodide of potassium is the best remedy, and it should be given in large doses. Wherever you find tertiary symptoms existing, the patient should receive large doses of iodide of potassium. I doubt very much whether mercury is capable of doing much good in this stage, and if given at all it should be in small doses. This plan is called by Keyes the giving of mercury in tonic doses, about half the regular quantity; but iodide of potassium should be pushed, commencing usually with twenty-five or thirty grains three times a day, and increasing one grain each day until the patient takes fifty or sixty grains at a dose three times a day.

A patient came to my office a week ago giving the history of having suffered intense pain in the legs, particularly between the knees and ankles, for a period of several months. She was a married woman in good circumstances; I did not know her husband or any of the particulars about the case. On questioning her I was unable to elicit any evidence of the early manifestations of syphilis, but on examination I discovered considerable enlargement—nodes—about the tibiæ, apparently an extensive thickening of the periosteum. I at once placed her upon large doses of iodide of potassium, believing the trouble to be syphilitic. She came to see me again yesterday, after the lapse of a week, and told me that for the last two nights she had been able to sleep soundly all night, something she had not done for several months previously, even under the use of strong opiates. The pains of which she complained at her first visit were much worse at night, which is a characteristic of syphilitic nodes. I have no doubt this case will be permanently relieved, provided she is kept under observation and treatment for a sufficient length of time. I gave her at the start thirty grains of the iodide of potassium three times a day and instructed her to increase the dose one grain a day until she was notified to stop.

The patient we have had before you should be impressed with the necessity of faithfully continuing the use of the prescription we will give her. The great difficulty encountered in the management of a case of syphilis is to keep the patient under treatment for a sufficient length of time. After the disappearance of the cutaneous symptoms the patient is apt to become negligent, not realizing the importance of taking medicine after the cutaneous manifestations have disappeared. In this class of cases particularly, where no treatment has been instituted until the appearance of the secondary manifestations, or even until a later period of the disease, with the utmost care in subsequent treatment, the so-called tertiary symptoms will sometimes develop. The tertiary stage of syphilis is one attended with extreme danger when the disease attacks any of the internal organs, the brain, for instance. When this occurs you may have paralysis as a result. Or it may attack the walls of the blood-vessels, producing a condition which will speedily lead to a fatal termination. When you are called to treat a case of tertiary syphilis, your main reliance as to medication should be placed upon iodide of potassium. I am aware of no other remedy which is capable of dissolving or removing tertiary syphilitic enlargements or nodes. I would like to reiterate, in the primary stage and in the secondary stage, particularly the first half, mercury should be the sole remedy; in the latter half of the second stage it is sometimes advisable to employ the mixed treatment, which consists of bichloride of mercury and iodide of potassium combined; in the so-called tertiary stage you should rely upon iodide of potassium alone given to the extent of removing the syphilitic deposits.

We will give this woman to-day the bichloride of mercury in doses of one-sixteenth of a grain three times a day. We shall instruct her, in using this remedy, to be careful about her teeth and gums, to keep them perfectly clean by means of an appropriate brush. With this precaution the danger of serious mouth symptoms is much less. If at any time it becomes necessary to use tonic treatment in addition to the mercury, we will place her upon it. The general health of a patient of this kind should be improved to the utmost, making use of any remedy which seems necessary to meet the indications.

In the treatment of syphilis I always tell my patients to avoid stimulants, unless there is some special indication for giving them.

I advise that the food be plain, wholesome, and sufficient in quantity to meet all the requirements of the economy. I do not place them on a restricted diet, but encourage them to eat plain food and plenty of it. I also tell them to avoid any undue physical or mental work, and try to place them in the most advantageous surroundings and under the best possible hygienic conditions.

The treatment of syphilis is a matter which demands our serious and careful consideration as practitioners of medicine, and much perseverance on the part of the patient, but I think the outlook is quite favorable in almost every case. I am satisfied that the disease can be thoroughly eradicated from the system. In looking back over my practice I believe I can safely say that I have entirely cured a great many cases.

We will have Mrs. R. report to us, so that we may see the results of our treatment from week to week. She complains most at the present time of sore throat and sore tongue. I shall expect these symptoms to disappear in a reasonable length of time under the use of mercury as we have directed.

The question has just been asked, "Does the eruption of syphilis usually itch?" No, it does not. That is one of the characteristics of the disease. You will find that the eruption of syphilis, as a rule, to which there are but few exceptions, is not accompanied by itching.

THE TREATMENT OF EMERGENCY CASES IN A COUNTRY PRACTICE.

AN ADDRESS TO THE COUNTRY PRACTITIONERS.

BY JAMES F. RINEHART, M.D.,

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GENTLEMEN,—To illustrate the variety of cases coming up in a country practice, and to illustrate at the same time the necessity for prompt and efficient action on the part of the physician in dealing with such cases, I beg leave to report the following:

CASE I.—Mrs. D., aged forty-two, thirteenth confinement, pregnant seven months. Examination showed dilatation to size of silver dollar, with slight hemorrhage. Pains were fairly good. Inquiry developed the fact that the “waters had broken,” though the membranes were apparently intact. As hemorrhage was very slight and lessened as labor progressed, the labor was allowed to take its own course. Dilatation was rapid, expulsive pains came on, and in half an hour the child and placenta came away together, with the membranes unbroken except for a very slight tear which had allowed the escape of the liquor amnii at the beginning of labor. The womb contracting nicely, attention was turned at once to the child. The membranes were ruptured and a child weighing three and one-half pounds was extracted, cord tied, and the child, which made feeble attempts at respiration, was put in warm blankets and placed close to the fire. A messenger was immediately sent to my office for my Gilbert incubator. This is a contrivance got up by Dr. R. B. Gilbert, of Louisville, Kentucky, consisting of two tin boxes, one within the other, separated by a two-inch space, the inner box for holding the baby and the space between the inner and outer boxes for holding warm water. This water is heated by means of a copper boiler connected with the end of the outer box by two tubes, one above the other. Under this boiler is placed a large lamp or small coal-oil stove. The

water in the boiler, as it is heated, rises and is forced into the water-chamber through the upper pipe, and, the cold water flowing in through the lower pipe, a continuous circulation of water is kept up around the inner box. This forms a convenient and cheap apparatus for regulating the body-heat of the premature child, and as the danger from loss of heat is the principal point to be watched in these cases, it becomes, as you see, a means of saving many lives that would otherwise be lost.

The mortality in these cases from hospital reports is for six-months children, eighty per cent.; for seven-months children, sixty-five per cent.; for eight-months children, fifteen per cent. These statistics (see *American Practitioner and News*, October 19, 1896, Dr. R. B. Gilbert) not only show the mortality to be high, but also do away with the popular belief that a seven-months baby will live better than one at eight months.

The temperature in this case was maintained at 100° F. for ten days. For the first three days the child made few attempts to cry, and could not nurse. A mixture was made as follows: cream, two drachms; milk, three drachms; pure water, ten drachms. Of this, three or four teaspoonfuls were given at intervals of two hours. The child was handled as little as possible.

Soon the little one became inured to the air and began to gain strength. On the fourth or fifth day it made feeble attempts at nursing, and by the tenth day had gained sufficient strength to nurse and sufficient vitality to be taken into a warm bed for a little while at a time with its mother. By the end of two weeks the incubator was dispensed with entirely. While it is possible that this child might have been raised by careful nursing, its safety was insured by the use of the incubator. It will be readily understood that in six- or six-and-one-half-months children an incubator of some kind would be an absolute necessity. I commend to you the one mentioned, not only for cheapness, but for efficiency. The top, I should have stated, was left open to admit air and light. When necessary to enclose it for the purpose of maintaining the heat within, it may be done by throwing over it some light material, such as a light shawl.

The baby is best wrapped lightly in absorbent cotton, a layer beneath and one above.

CASE II.—Boy, E. S., aged five and one-half years, colored, suffering from what appeared from inspection to be membranous croup.

Examination of fauces revealed a diphtheritic deposit the size of a five-cent piece on the left tonsil. Diagnosis, diphtheritic laryngitis.

Respiration growing more and more difficult, an intubation tube was inserted. This was done in the usual manner, the gag being placed in the mouth with the child wrapped tightly in a blanket from head to foot and held in same position as emphasized by Dr. Northrup in "Cyclopædia of the Diseases of Children,"—viz., "as though suspended by the head." The front finger of the left hand was introduced into the throat, the epiglottis pulled forward, and the tube guided by the finger into the entrance of the larynx. At this point the handle of the instrument, which before was depressed upon the child's breast, was elevated in the middle line and the tube made to enter the larynx. The tube was disengaged from the obturator, the obturator removed, and the tube gently but firmly pressed down until its top could be covered by the epiglottis.

The effect in this case was rapid relief to respiration. An injection of one thousand units of antitoxin was given and the patient put upon five drops of tincture of iron and one-grain doses of quinine every four hours, with milk and whiskey every two hours.

A tent was put over him into which was directed the steam from a croup-kettle, into the water in which was put turpentine, a table-spoonful to the quart. This steam was used for one or two hours five or six times in a day and night. On the fifth day the diphtheritic patch on the left tonsil softened and came away, though the temperature remained as it had been before,—about 101°. On the eighth day the temperature went up to 104°, and a pneumonic spot was found in the left lung, posteriorly, almost the size of the hand.

The tube was removed, and on the ninth day the pneumonic spot was lessened in area and gradually disappeared.

There is one thing of which I wish to speak before I close, and that is, of removing the tube. In this case, partly from inspissated mucus and partly from deposit of lime from the inhalation of steam (as the water used was well-water strongly impregnated with lime), it was impossible to use the instrument ordinarily used in removing the tube. The hook sold with the intubation set and made to fit the front finger was then tried, but with no success. I then improvised a hook from my pocket-case made from a flat-pointed probe, which I used after the following fashion: The front finger of the left hand was introduced, as in introducing the tube, and the little wire on the

top of the tube was caught under the finger-nail. The hook was then directed along the back of the finger and pushed over the end of the finger and drawn under the wire. Then the finger and hook were elevated together and the tube was withdrawn. It occurred to me that a magnet might be used to remove these tubes. I do not know whether this has ever been suggested or tried by any one or not, nor do I know that it is feasible even.

CASE III.—Mr. J. B. C., aged forty-seven, had been drinking heavily for three weeks. I was called to see him hurriedly, as he was in a stupor and could not be aroused. Pupils contracted, face cyanosed, pulse feeble and about 78, respiration 3 or 4 per minute.

Diagnosis made was opium-poisoning, third stage, though this was not at all certain. A messenger was sent two miles to my office for a stomach-tube and permanganate of potassium. Sylvester's method of artificial respiration was begun and kept up for two hours. This was practised as follows: Shoulders were elevated, feet held by assistant, and arms slowly elevated, crossed, extended, and depressed, the assistant at the same time making counter-extension on feet. By this means we were able to fill the lungs with air, using light pressure only on the chest for fear of compressing the heart and lungs too much.

At the end of two hours the patient was revived enough to make it possible to use the tube. Before that time cessation of efforts at artificial respiration was followed by immediate cessation of all efforts on the part of the patient to breathe. As soon as voluntary respiration was established the tube was introduced, the stomach filled with a solution of permanganate of potassium, and the stomach contents removed by stripping the tube. This was done by holding the tube near the mouth with the left hand and stripping it (previously oiled) between the thumb and fingers of the right. In this manner the stomach was washed, and then through the tube was poured into the stomach a solution containing five grains of permanganate of potassium, and a second solution containing five grains of citrate of caffeine. The tube was then removed, and the patient was found to be comatose again, with scarcely any attempts at respiration. No amount of flagellation served to arouse him, and artificial respiration was again resorted to, with the application of the battery (Faradic) each time to the pit of the stomach, the positive pole being applied to the nape of the neck. With the use of the battery it was much

easier to keep up his breathing, and soon the efforts at artificial respiration were left off, as voluntary efforts were being made, which, being aided by the battery, sufficed. One notable fact was that in twenty minutes after the use of the battery was begun his extremities, which before had been cold, became warm. The pulse improved, and in half an hour the patient began to show evidences of pain upon application of the electric current.

In about an hour he awoke, with the remark that "there was something hurting him pretty bad in his stomach, something serious he was afraid."

From that time on it was necessary to use the battery at intervals of a few minutes only in order to keep him awake.

I cannot speak too highly of the use of the battery in this case, and had I had the battery in the beginning I could have saved the patient a great deal of rough handling and thus have avoided the soreness which followed in the case. The most happy effect was noted upon the pulse and circulation in this case from stimulation, I have no doubt, of the nerve-centres by the electric current.

The only notable after-effects in this case were the soreness of the muscles and sleeplessness from over-stimulation of the nervous system. This was controlled by *asafetida*, in three-grain doses every two or three hours. His weakness was relieved by tablespoonful-doses of whiskey every three or four hours.

The patient confessed to having taken half a teaspoonful of morphine, and told us where we could find his bottle. The bottle was found in the place mentioned.

The diagnosis in this case was strengthened by seeing the patient, when he was first roused to semi-consciousness, attempt to scratch his head. It was further strengthened by slight rigidity at times of his extremities, all of them being rigid alike, which would not have occurred in apoplexy with paralysis. The contracted pupils, the slow breathing, the lack of any history of previous kidney trouble, and the fact that a fair quantity of normal-looking urine was withdrawn with the catheter, all served to distinguish the case in some measure from uræmia.

While these cases present few remarkable points, still they serve to show, as stated in the beginning, the great variety of cases a country physician may be called upon to treat, and the necessity for prompt and efficient action. I wish to reiterate the statement that

country physicians may qualify themselves to handle a great many cases ordinarily treated in cities by specialists only, and that in a way entirely satisfactory to their patients and themselves.

NOTE.—Some two months after the above case occurred, the patient went to Louisville to sell his tobacco. He was found on the river front (where he had lain unconscious for several hours), and was taken to the city hospital. Here he was aroused by the usual means, the hospital attendants thinking he was out of danger. In a few minutes he became unconscious again, and lived only a little while. This was doubtless from reabsorption of morphine, which had been eliminated by the mucous membrane of the stomach, or possibly from still further absorption of morphine which was taken and had not, at the time he was found, been brought in contact with the stomach-walls, he having taken the dose upon a full stomach. Had the stomach-tube been used, it is highly probable the relapse could have been prevented.

Medicine.

DIABETES MELLITUS.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY OF BERLIN.

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GENTLEMEN,—The cases I shall present to you to-day are characteristic examples of the two forms of diabetes, and will give us the opportunity of discussing the special features in the diagnosis and treatment of the disease that clinical experience has picked out from the mass of work done on the subject as of lasting practical importance.

CASE I.—The first patient is a man who has been treated in the out-patient department; F. S., thirty-six years old, well built and well nourished. He is a merchant's clerk, and was perfectly healthy up to about four months ago. He then noticed an inflammation, or a soreness, rather, of his gums. For this he consulted no doctor, but used odol, a popular mouth-wash here in Berlin, and vigorously scrubbed his gums with a hard tooth-brush, undoubtedly making the condition worse. A severe gingivitis, as is evident from his description, developed, the gums became too tender to brush, and his teeth became loose in their sockets.

He then did nothing for them for a while, and though he remembers no material change in his diet, they became practically well. It is probable that without his realizing it the limitation of his diet, owing to his sore mouth and the fact that owing to the hardness of the bread usually eaten by the common people this limitation affected especially the carbohydrates and made him live more on milk and eggs, had its effect on his diabetes, for diabetic he proved to be when examined some months later. The case constitutes a rather striking example of nature taking her own way, and that not seemingly a very direct one, to secure rational therapeutic treatment

of the disease. There was at no time excessive thirst or notably increased urination.

About two months ago he noticed that he became tired easily while making his rounds among his customers, and that he was often bothered by cramps in his calves. He also noticed that his memory was growing weaker. What especially aroused his attention, however, was that his sexual potency was greatly lowered. He had been, when younger, rather given to venery, and this anticipation of old age at the prime of life was a source of a great deal of discomfort and anxiety.

The first urinary examination, made some hours after dinner, showed four per cent. of sugar. In the urine of the twenty-four hours on regular diet there was one and five-tenths per cent. of sugar. The quantity was not large, only two thousand two hundred cubic centimetres. On a diet free from sugar there was absolutely no trace of sugar in his urine. He was placed on strict diet, only fifty grammes of bread being allowed him daily, and his symptoms have gradually disappeared with the disappearance of the sugar. He no longer has his "tired feeling," his cramps have left him, above all, his sexual potency has returned, and he rejoices proportionately. At no time did he receive any medicine for his diabetes.

CASE II.—The second case I shall have brought in now. It represents the reverse of the medal,—one of the cases in which all our therapeutic measures fail, where, with the simple hope of prolonging life, we have practically given up all dietary restrictions and are only ameliorating the obvious and inevitable tendency to death. A. B. is twenty-seven, a coachman. He noticed his first symptom about nine months ago. In spite of the fact that he ate very heartily, he noted that he was getting thin. His appetite became almost insatiable, but still he grew thin. He was greatly bothered by thirst too, and especially at night. He frequently had to get up to get a drink. He weighed one hundred and sixty pounds usually, but four months after his attention was first called to his symptoms he had lost thirty pounds.

The first doctor he went to found sugar in his urine, but in spite of a stringent diet he grew worse. Then he came to the hospital greatly emaciated, with harsh, dry skin, suffering greatly from thirst, and passing three and a half litres of urine per day, in which there was two and a half per cent of sugar. Gerhard's iron chloride test

was strongly positive, and the prognosis was the worst possible. He was put on absolute diet, without any carbohydrates. All bread, even, was forbidden, but with all this the sugar contents of his urine did not go below two per cent. He began to complain of headache. The further absolute withdrawal of carbohydrates would evidently have been dangerous, and a strictly meat diet only precipitate the inevitable. He was given two litres of milk daily, plenty of vegetables and six to eight eggs. On this he has been more comfortable, but his sugar excretion is as high as six per cent., and it is only a question of time before *exitus lethalis* probably in coma closes the scene.

The diagnosis of diabetes, once attention is called to the urine and an examination of it is made for sugar, is one of the easiest problems in medicine. In hospital work with plenty of assistants at hand, where an examination of the urine is routine work, it should never remain unsuspected. Much as it is to be desired, however, it is practically impossible in private practice to examine the urine of every patient, and so cases of diabetes sometimes are under treatment for some time before some suspicious circumstance leads to an examination of the urine and the discovery of the glycosuria.

What premonitory combination of symptoms, then, should lead us to examine the urine for sugar? is really the important question for the diagnosis of diabetes. The best answer, I think, is any abnormal lowering of organic function for which no immediate cause can be found. Especially is this true, as in our first case to-day, as regards muscular function. Every tired feeling not connected with some correlative muscular exertion must be considered suspicious. This is often the earliest symptom of the disease. The muscles, as the great heat-producing agencies in the body, have been considered theoretically to be the great carbohydrate consumers of the system. They burn up sugar with the production of heat and energy. It is not surprising, therefore, that a disturbance of the sugar metabolism in the body should produce muscular symptoms very soon.

Another suspicious symptom is for a patient to lose in weight seemingly without a cause, as in our second case, while sexual impotence constitutes the complaint with which some diabetic patients come to their physician. It is a rule with Professor Fürbringer, who has had considerable experience with sexual impotence, to

always examine the urine for albumen and sugar, and to test the knee-reflex in such patients.

Another characteristic symptom of beginning diabetes is a feeling of psychical incapacity. Patients feel unable to accomplish the mental work involved in their ordinary avocation perhaps, or that required by some unusual though not too exacting emergency. Such a complaint does not come from the ordinary class of patient, from the proletariat, but often constitutes the signal in better-class patients to look for glycosuria. It is often accompanied by a loss of memory and sagacity; sometimes a slight change of disposition, noticeable to the patient's friends, supervenes. Of course these may mean neurasthenia or the beginning of general paralysis, but should always lead to an examination of the urine for sugar.

The ordinary symptoms are not so likely to escape notice or their significance be missed. When a patient grows thin without an evident cause, or has increased thirst,—polydipsia,—or a greatly increased appetite,—polyphagia,—with a large amount of urine, the doctor is not liable to neglect the urine examination, and the same thing holds for such almost pathognomonic symptoms as a tendency to furunculosis, severe pruritis, chronic healing of simple wounds, unaccountable failure of simple incisions to heal by primary union, or the appearance, in young people especially, without obvious cause, of cataract or hemorrhagic retinitis, or of sciatica, especially with double, or persistent oft-repeated muscular cramps. Gingivitis, as in our first case, is rarer, yet not so rare as to be anomalous.

When the urine examination is made, it must be remembered that a negative result after one or even several examinations is not proof positive of the non-existence of diabetes. In the lighter forms of diabetes it is probable that in about one-half the cases there is no sugar in the morning urine, just the urine a patient is apt to bring his physician for examination unless given special directions. A sample of the mixed urine of the twenty-four hours should always be required, for even after a light breakfast there may be no sugar, while after dinner it may be present abundantly. Some patients have glycosuria only after a generous meal of carbohydrates. It is sometimes well to direct that a plentiful meal of bread and starchy vegetables, with beer,—for beer is a good sugar-producer,—be taken, and then the urine collected for examination. If there is no sugar, then there is no diabetes, it may be confidently said. Only one thing

is to be remembered in such a test: it is that if considerable muscular exercise be taken after the meal the carbohydrates may all be consumed by the muscles and not appear in the urine, as they would if the patient were pursuing a sedentary occupation.

As to the methods of testing whether sugar is present in the urine, there are a good many, but their number does not always make it easy to decide when but small amounts are present, and that is when they are especially required. Trommer's test, the usual one, has always seemed to me unsatisfactory when there was question of but small amounts of sugar, and for myself I prefer Nylander's test. Nylander's reagent (Rochelle salt 4.0, bismuth subnitrate 2.0, and ten-per-cent. sodium hydrate solution 100) may be easily obtained at any pharmacist's. The striking black color produced when one-tenth of the colorless reagent is added to the suspected urine makes the detection of even small quantities of sugar easy.

Should any doubt remain, the fermentation test gives the most assurance, and this constitutes the best and easiest method for the quantitative determination of the sugar present. Fehling's quantitative method sometimes takes an hour or more of titration, while the fermentation test in a tube graduated for the purpose takes very little time for the moment, and the delay of twenty-four hours involved makes really no material difference in such cases. A method I like very much myself is the specific gravity determination before and after fermentation and the multiplication of the difference by the factor 0.22. I employ it instead of the polariscope constantly in office practice, and find it quite exact enough.

As to most of the other tests for sugar, they are of special use only under certain circumstances. The phenylhydrazine test, for instance, is of scientific rather than practical use, very minute quantities of sugar being thus easily determinable.

Where the sugar test is positive it does not always mean diabetes, for there are forms of glycosuria which are not pathological. In pregnant and nursing women milk-sugar often appears in the urine. This lactosuria is due to the absorption of milk-sugar after its formation in the lacteal glands and its consequent excretion. Some recent experiments, in which milk-sugar was injected subcutaneously, seem to show that in the circulation nature can make no use of milk-sugar, for the amount injected was invariably excreted in the urine. Only in the form of grape- or malt-sugar can

the carbohydrates of the system appear in the circulation if they are afterwards to be available for metabolic processes.

Besides this lactosuria, there is a glycosuria in which grape-sugar appears in the urine and yet is physiological. Hofmeister considers that the normal individual even in health is capable of making use of only a limited amount of carbohydrates in a given time. This limit he sets down ordinarily as one hundred and fifty grammes at a meal. When more than this is consumed, it is not stored up in the system, but immediately excreted. The liver will contain only a limited amount of glycogen, the form in which the carbohydrates are stored, and when this limit is exceeded the excess of glycogen appears in the blood. This hyperglycæmia causes glycosuria, which is not true diabetes, but only a proper exercise of the excretory function as regards a material for which nature has no use.

As to when this alimentary glycosuria, as it has been called, may be looked for, something further may be said. It is not liable to appear after the consumption of fruit, for the sugar in fruit is mainly levulose, while it is dextrose that supplies the sugar to the organism. As regards starch, especially when taken in its commonest form, bread, it does not easily produce alimentary glycosuria, because to digest and absorb sufficient of it from the digestive tract takes somewhat more than eight hours, and in the mean time metabolic processes have led to the consumption of that first absorbed.

A large amount of sweet wine taken within a short time, a large amount of grapes, or of confectionery, readily lead to physiological glycosuria, and in young people especially, where a urine examination undertaken perhaps for other reasons discloses the presence of sugar in the urine, it is well to ask with regard to the last meal before attaching any value to the discovery. Champagne, which is very rich in sugar, some brands containing more than eight per cent., is especially liable to cause glycosuria. In what might be considered a not very unpleasant experiment at Munich not long since, it was found that two bottles of champagne gave alimentary glycosuria. It would not be apt to do this if the sitting at which it was consumed had been a prolonged one.

It is always to be remembered, however, with regard to physiological glycosuria that so great an authority as Frerichs considered even minute quantities of sugar suspicious; and, besides, it is proba-

ble that abuse of the faculty to absorb sugar by exceeding its limit can lower the power to assimilate the carbohydrates. Experiments with so important a nutritional faculty are dangerous. Fat persons, as a rule, though often gifted with a "sweet tooth," cannot assimilate sugar as well as muscular individuals, and it is especially in them that the slightest glycosuria is suspicious.

The power of assimilating sugar not only differs in different individuals, but in the same individual under changing circumstances. Hofmeister found that in hungry dogs their sugar assimilating power was much less than when they had been fed regularly. He concluded that in weakened individuals generally their sugar assimilative power would be diminished. This is true, also, as a consequence of certain tissue poisons. Gout and Basedow's disease produce tendencies to diabetes in this way, and the same thing holds for alcoholism and the traumatic neuroses. In general, nerve disturbances, great emotions, and neurasthenia may lead to a temporary diabetes, but this is always to be considered a serious symptom, for these interferences with the assimilative faculty for sugar easily lead to a permanent diminution of it.

There is at least one drug which produces a temporary glycosuria. It is phlorizin, which some years ago enjoyed the temporary reputation of a specific for cancer. Its connection with glycosuria became known through the case of a young man who for a long time imposed on his physicians by simulating diabetes, and taking phlorizin to cause the appearance of sugar in his urine.

I have said enough to show that diabetes itself means very little. It is as if one said a patient had tuberculosis of the lungs. This may mean a rapidly progressive process leading inevitably to death in a short time, or it may mean only a little roughened breathing with perhaps some râles at one apex and some bacilli in the sputum, the affection being a stationary one, or perhaps with a tendency to cure.

The distinction of forms in diabetes is extremely important. This cannot be determined from the amount of sugar in the urine alone, for as high as six per cent. of sugar after a heavy meal with plenteous carbohydrates means no more and perhaps less than one per cent. when the patient is fasting. Some of the other signs of a severe diabetes may fail to be present in severe cases. The patient need not necessarily be thin, with the harsh, dry skin so often pictured, and yet have a very serious form of diabetes. In the poorer

class of patients these appearances are seen, because sugar excreted in the urine acts as a diuretic, and so, besides depriving the tissues of their nutritive material, extracts water continually from the organism. The better class of patients come to their physician before these external symptoms are manifest, however.

When severe headache occurs persistently during diabetes it is usually a serious symptom. The only really accurate test of the severe form of diabetes is Gerhardt's chloride of iron reaction. When the urine gives with this reagent a red color, then the prognosis is absolutely bad. Usually the patient will be dead within a year, and only one or two cases in medical literature have lived two years, the longest after a positive test living two and three-quarter years. There is one circumstance that vitiates the value of this test in the matter of absolute prognosis. If the diabetic patient is at the time suffering from severe indigestion, and this is not so rare in diabetics, the existence of substances in the urine that give Gerhardt's reaction may be only a passing accident. It is the presence of various acids, acetic, diacetic, and butyric acids, that give the reaction, and these may be formed in and absorbed from the intestine during the course of delayed and disturbed digestive processes, to disappear completely when the intestinal condition improves. It is to be remembered, too, that certain coal-tar products produce a reaction not unlike that of the acids with the chloride of iron, though with care they may be distinguished. Phenacetin gives a brownish red, antipyrin a bluish red, salicylic acid a dark, smoky red. On the other hand, if the urine is for some reason strongly alkaline, as after the taking of considerable bicarbonate of sodium, then the acid reaction is obscured, and it is possible to make a better prognosis than the case justifies. Before applying Gerhardt's test the reaction of the urine should be carefully looked to.

When a diabetic patient comes for treatment, a decision as to the form of diabetes he has should be made at once. If the iron chloride reaction is absent, as it usually will be in private practice, it should be determined if the patient only excretes as sugar the carbohydrates ingested, or if certain of the proteids also become sugar and are excreted. For this an absolute diet must be prescribed for a day or two and the urine carefully examined. For breakfast the patient may be allowed coffee—without sugar, of course—and an egg; for dinner, bouillon with eggs and butter, and the same for supper. If after

twenty-four hours of this diet no sugar is found in the urine, the patient has but a light form of diabetes, and may be completely reassured as to his condition. If the sugar disappears only after forty-eight hours, the prognosis of the case is good, and the diabetes not a severe one. If more than one-half per cent. of sugar remains, despite the stringent diet, then the case is a severe one. Further tests will enable one to decide how much in the lighter forms of diabetes the sugar-assimilative faculty has suffered, and this may be decided with an accuracy that will be of a great deal of service in the dietetic treatment of the disease. If, for instance, a patient be allowed to take one hundred grammes of bread which contains in the form of starch about sixty grammes of sugar, and is able to properly assimilate it, no sugar appearing in the urine, it is clear that this much carbohydrates may be allowed regularly at least. Higher or lower amounts of carbohydrates may be allowed, with subsequent careful urine examinations, until the limits of the patient's sugar assimilation are thoroughly known, and then, by keeping within these, no further abuse of the assimilative faculty, with consequent diminution of its effectiveness, takes place. For it seems to be clear that the abuse of the assimilative faculty for carbohydrates tends to its further degeneration, while the sparing it for a time leads to its recuperation.

In the treatment of diabetes the consideration of the form of the affection is the most important indication. In the severe form, where Gerhardt's reaction is present and there is the characteristic fruity odor to the breath, with perhaps some persistent headache, the diet should not be too strictly limited. A strictly flesh diet leads only to increased acidity of the blood and precipitates the inevitable coma. Such patients are doomed anyhow, and live longest and most comfortably on a mixed diet. In judging the fruity odor of the breath, care must be taken not to mistake the odor of certain wines, especially Hungarian, for the characteristic sour-apple smell of the diabetic breath. It is in these severe cases that an absolute exclusive milk-diet has often been found to be of the greatest service.

In the lighter forms of diabetes, having decided the limits of the patient's sugar-assimilative faculty, we must keep within them. This is much better than trying to cut off the carbohydrates entirely. Severity in this matter gives patients often unnecessary suffering and easily leads to deception on their part as the craving for carbohydrates becomes almost irresistible. Bread is especially longed for,

and experience seems to show that on the whole the best form to allow, whatever carbohydrates seem permissible, is bread in some form.

As a good working rule, so much carbohydrates may be allowed as will keep the sugar in the urine under one-half per cent. Besides bread, there may be permitted certain fruits, nuts, and vegetables as have their sugar in forms not easily convertible into dextrose, but in other forms which the organism may still make use of even in severe diabetes, such, for example, as green beans, which contain inulin, a substance which, though resembling ordinary sugar very much, diabetics have not lost the power to properly metabolize. The pleasant flavor of nuts is due to mannite, which is an alcohol and perfectly allowable as an element of diabetic diet. The edible fungi contain the same substance. It is to be remembered that mannite is somewhat laxative in its action, and this property may be a disadvantage under certain circumstances, though it is usually of decided advantage, as it prevents fermentative processes in the intestine, and so avoids the accumulation in the system of intestinal toxins and the inconveniences their elimination involves.

A certain amount of bread may be replaced by green vegetables in the dietary. Spinach, for instance, contains but five per cent. of carbohydrates. A large plateful will not contain more than seven and a half grammes of carbohydrates, and yet when served dressed in plentiful butter will go far towards satisfying the appetite at a meal. When fresh vegetables contain a larger proportion of carbohydrates, as red cabbage, which has over twelve per cent., then their use is not so advisable. Besides the green vegetables, there are some others that commend themselves by their low carbohydrate contents. Such are our German swine-root or black-root and topinamboor, and the stachys bulbs or Japanese potatoes, which Naunyn has found so useful. These last have a pleasant nutty taste and are very much appreciated as an addition to their diet by diabetics. They can now be generally obtained through fruit handlers in our large cities.

The greatest difficulty with diabetics, however, is the craving for bread where this can be allowed only in small quantities. Most attempts to replace it by something resembling it, but not containing so large an amount of carbohydrates, have been unsuccessful. Graham bread, recommended for a while, was an illusion, and contains prac-

tically as much starch as white bread. Almond bread never proved tasty for any length of time. Alaurenot bread, containing about one-half the amount of carbohydrates usually found in bread, is the best substitute for ordinary bread yet tried. Rademan's biscuit have been deservedly popular here in Germany, not so much because they contain little carbohydrates, but because they are combined plentifully with fat, three grammes to each biscuit, and so satisfy the appetite very soon. An article of diet that used to be absolutely excluded, and for that reason sometimes longed for, was honey. Recent investigations show that one-half of its seventy-five per cent. of sugar is in the form of levulose, which is harmless, so that in light cases of diabetes honey might be sometimes allowed.

With regard to liquids, the patient is to be allowed to take all the water desired. As the alkalies seem to be good for the patient in diabetes, this would better be taken in the form of some mild alkali mineral water, just which one does not make much difference. As regards milk, some patients stand it very well and may use considerable quantities of it without an increase of their glycosuria; others do not, and the only way to decide is to allow a certain amount of milk and carefully watch the urine for an increase of sugar elimination.

Beer is not allowed, not because of the alcohol it contains, but of the dextrin and other sugar materials in its composition. A little cognac and water make the best drink for diabetics who seem to need stimulation, but not much should be allowed, as it interferes with digestion, a very important consideration in diabetes, and lowers vital resistance by its action on general cellular life. Sour dry wines may be guardedly allowed, but no sweet wines, and especially no champagne. There is, however, a brand of champagne now manufactured especially for diabetics containing no sugar, or but very slight amounts.

I have spoken of the treatment of the severer forms and of the lighter forms of diabetes. As to whether these two forms of the affection constitute two distinct entities entirely unconnected with each other and due to absolutely different causes, or whether the lighter form may run into the severer one, is yet an open question. The intermediate forms, with outspoken tendencies to become the severe fatal forms, must be extremely rare. Naunyn has reported some of them. Others of large experience have failed to find them,

though looking carefully for them. It is the possibility of such cases that must make the dietetic treatment of diabetes an extremely careful one at the beginning. Not alone must the quality of the food in reference to the carbohydrates be regulated, but the quantity of all kinds of food to be taken must be carefully marked out. Where large quantities of albuminous food are taken, with the sugar metabolic faculty seriously disturbed, it seems clear that carbohydrates are manufactured in the system itself out of albuminous compounds and then excreted. It is thus that in mild diabetes large quantities of food, even when not containing carbohydrates in large proportion, may still lead to that intense lowering of the sugar-assimilative faculty which constitutes the severer form of diabetes.

In every case it is to be remembered that it is the patient, not his diabetes merely, that is to be treated, and each patient must be the subject of special study. Patients suffering with the lighter forms of diabetes usually die of intercurrent diseases, and certain of these are so intimately connected with diabetes that they deserve a place here in talking of the treatment of diabetes, because prophylaxis constitutes the best way of keeping a patient healthy.

About one-half the diabetics treated in hospitals die of tuberculosis, and in general their resistive power to the tubercle bacillus is extremely slight. Clinically it is considered that a tubercular patient with even so much as one-half per cent. of sugar in his urine is very liable to have the tuberculous process become acute, while a diabetic who contracts tuberculosis is almost inevitably doomed. The explanation of the fact would seem to be found in the fact that tubercle bacilli grow best on blood-serum to which six per cent. of sugar and six per cent. of glycerin has been added, and so their blood-serum makes an excellent culture medium. All diabetics should be warned of the danger they run in associating with tubercular patients and should never be treated in wards where consumptives are.

As a compensatory advantage it has been noted that diabetics seldom contract pneumonia, there being but half a dozen cases in medical literature, and here, too, bacteriology would seem to afford the explanation, for the diplococcus pneumoniae absolutely refuses to grow on a sugared medium. The pus organisms grow very readily and with special luxuriance on such media, however; hence the tendency to furunculosis, to carbuncles, and to erysipelatous processes.

Liebreich considers that the human skin is protected from the invasion of micro-organisms generally by the cholesterin present in the lanolin, which greases the normal skin. In diabetes this is deficient, and besides, owing to the extraction of water from the tissues, the skin is even more dry and flaky and more in need of protection than normally. He supplies the lanolin artificially, and it seems worth the trying. A part of the body is rubbed with lanolin each day or two, so that about every fourteen days the whole body is gone over.

In speaking of the diet, I recommended alkaline waters, and now under the head of treatment comes the question of sending diabetic patients to Carlsbad or some corresponding alkali water cure. I do not think that Carlsbad possesses any specific for the disease. Even the Carlsbad physicians have lessened their pretensions in this matter of late years, and much less of the waters are prescribed for patients who go there than was the case twenty years ago. We know the chemical composition of the springs, and there is nothing marvellous about them. Some, especially those personally interested in Carlsbad, insist with Liebreich that we know only the coarser chemical composition of the salty ingredients of the springs, and those only as far as our present-day chemistry will reach. They point to the recent discovery of argon, and argue that just as important new discoveries may be made in water which may change the aspect of mineral water therapy. Then, too, we know the ingredients, they say, but not their manner of combination, and to merely throw the elements together again may not produce anything like the original substances as found in nature.

Notwithstanding all this, however, it is probable that the psychic element, as Frerichs said, has more to do with Carlsbad's reputation than anything else. Auto-suggestion plays an important rôle in the matter without a doubt. When patients have Carlsbad on the brain, then it is better to send them there. Otherwise they will be restless and uneasy, and this state of the nervous system is eminently unfavorable to the progress of a diabetes. At Carlsbad itself the arrangements are calculated to produce just the opposite effect. The perfectly regular life is soothing and restful; regular exercise aids metabolism, decreases diuresis, and encourages sleep. The habits of the place are such that the patient is not tempted to break through the dietary regulations. Altogether the effect is excellent, and patients in whom it has been extremely difficult at times to keep

the glycosuria moderate go to Carlsbad, to have their sugar disappear almost completely. One of the good effects certainly is that patients are away from friends and business, two sources of worry that often keep diabetics from improving as they otherwise would at home.

As to drugs, there is no specific for diabetes, despite the many claims that have been made. In the severer forms of diabetes, opium in increasing doses is a very useful drug. It does not lessen the glycosuria directly, but it lessens the thirst, soothes the nerves, decreases the appetite, and so serves indirectly to modify the course of the diabetes. I prefer the crude drug or its extract to any of its alkaloids. In the lighter forms it has the serious disadvantage of producing the opium habit without what I consider sufficient cause, and so I prefer not to use it.

The coal-tar nerve sedatives in general, antipyrin, phenacetin, and the salicylates, have also proved useful in the treatment of the disease, but for their sedative properties, not because of any specific effect. Carbolic acid and creosote were considered for a time to have some specific action, but it seems clear now that it was because of their tonic stomachic qualities that they produced the results reported after their use. In doses of 0.05 I have often found them useful. *Pilulæ myrtillæ*, that have enjoyed a reputation outside the profession, are absolutely without effect.

As a rule, patients will not be satisfied to be treated by dieting alone, and demand medicines; besides, it is easier to confine them strictly to their diet when medicine is being taken, too. In the lighter forms I often prescribe—

R Iodoform., *ziss*;
Fiant pilulæ No. lx.

Sig.—One pill to be taken two to three times a day.

It acts as an intestinal antiseptic, and by so lessening the absorption of intestinal toxins keeps the patients in good general condition.

For the constipation of diabetes, tamarinds or manna may be prescribed, but a cold, wet bandage and massage are better. The occasional use of liquorice powder keeps the bowels cleaned out and decreases the sugar absorption.

THE DIFFERENTIAL DIAGNOSIS OF KIDNEY LESIONS BY THE MICROSCOPICAL EXAMINATION OF THE URINE.

BY LOUIS HEITZMANN, M.D.,

New York.

ALTHOUGH very few physicians will, at the present time, doubt the value of the microscope as an aid to clinical diagnosis, most of them will declare that in urinary analysis a microscopical diagnosis can at best be only of secondary importance. They will rely upon the clinical symptoms, and are satisfied if they find albumen and casts in the urine. There is, however, no branch of medical science in which the microscope is of greater importance than in the diagnosis of kidney lesions, which may lead to a proper appreciation of the patient's affection long before the clinical symptoms are pronounced, since a number of kidney-diseases can only be correctly diagnosed by means of the microscopical examination of the urine.

No diseases present a greater confusion in their nomenclature than the lesions of the kidney, and very few authors agree in the terminology of these affections. Inflammations of the kidney are variously termed Bright's disease, interstitial, exudative, desquamative, parenchymatous, and diffuse nephritis, and yet none are more simple than these if we only bear in mind the anatomical structure of the kidney. The kidney is a compound tubular gland, consisting of epithelial and connective tissue, the latter carrying the blood-vessel. If such an organ become inflamed, all its component parts are bound to become affected to a greater or less degree, so that such an inflammation will be diffuse at the very outset. The difference exists only in the degree in which the different portions—that is, connective tissue and epithelium—are affected. Every inflammation primarily commences in the connective tissue; it is, therefore, “interstitial,” and secondarily affects the epithelia, being then also “parenchymatous.” Though not strictly correct, we may,

however, speak of a parenchymatous nephritis when the pathological changes in the epithelia are more pronounced than in the connective tissue, and of an interstitial nephritis when the changes remain more pronounced in the connective tissue. The term "Bright's disease" should never be employed, because it is unscientific, and has been used for all varieties of nephritis.

Since, from what has been said, it will be seen that every interstitial inflammation must also be parenchymatous, and *vice versa*, the old terms "catarrhal" and "croupous," still universally used for inflammations in different organs, are far more preferable. We shall, therefore, divide primary inflammation of the kidney into three kinds,—viz., (1) catarrhal, (2) croupous, and (3) suppurative, the latter being the most intense.

In catarrhal (desquamative, interstitial) nephritis, the pathological changes consist of oedematous swelling and inflammatory infiltration of the connective tissue, swelling and granular cloudiness of the epithelial covering of the tubules, and subsequent desquamation of the epithelium, with formation of pus-corpuscles from the latter. The blood-vessels are more or less distended with blood-corpuscles. In chronic catarrhal nephritis, a new formation of connective tissue takes place. This variety leads to a shrinkage of the kidney,—cirrhosis. In croupous or parenchymatous inflammation, the surface becomes partially or completely denuded of its epithelium, a coagulated albuminous or fibrinous exudate is formed upon the surface, there is considerable hyperæmia of the blood-vessels, and a swelling and inflammatory infiltration of the connective tissue. We now have the presence of casts, which probably have originated from a degeneration of the tubular epithelium and a coalescence of epithelia thus degenerated. This variety may terminate either in hypertrophy of the kidney, due to an increase in the interstitial connective tissue, or in atrophy of circumscribed portions of the kidney, with more or less destruction of the epithelial formations of the affected parts.

The most intense variety of inflammation of the kidney is the suppurative, which is similar to the formation of an abscess in other organs. For a long time this variety has been considered to be a purely interstitial inflammation, since the opinion prevailed that pus-corpuscles could only be formed from connective-tissue cells. This has, however, long since been proved erroneous, and there is no

doubt that the epithelia take an active part in the formation of pus. The blood-vessels in this variety soon become destroyed.

With these few introductory remarks, we are now ready to study the features of a nephritis as found in the urinary sediments. Before doing so, however, a word of caution should be added regarding the presence of albumen in urine. Whenever albumen is found, many physicians will at once diagnose a nephritis, without any microscopical examination of the sediment. This is absolutely incorrect, for, not only may albumen, even in large quantities, be present without any pathological changes in the urinary organs, as, for instance, in the so-called functional or essential albuminuria, but inflammations in other organs, as, for instance, the bladder or prostate gland, where pus-corpuscles are found in the urine, will also cause the presence of a varying amount of albumen. In such cases the kidney may be perfectly normal. The diagnosis of a nephritis should, therefore, never be made without the characteristic features of such an inflammation being present in the urinary sediment.

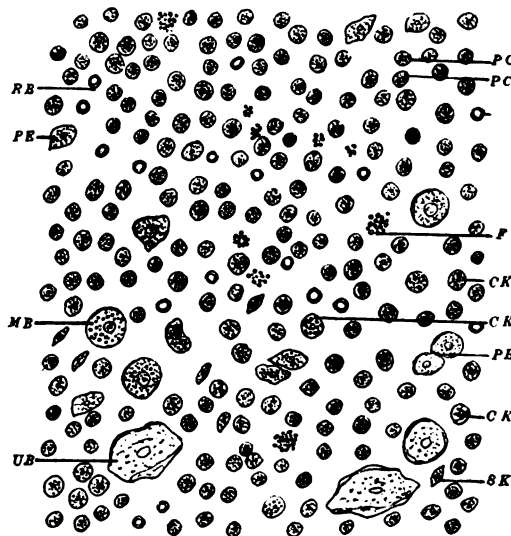
From what has been said it is plain that a diagnosis of any inflammation in the genito-urinary organs can never be made without the presence of pus-corpuscles in the urine. These pus-corpuscles are derived to a great degree from the epithelia themselves, the protoplasm of which becomes changed by endogenous new formation to inflammatory corpuscles, which later reach the surface of the epithelia and are carried along by the urine as pus-corpuscles. These pus-corpuscles, when present in moderate or large numbers, will invariably allow us to form an opinion as to the constitution of the patient. All pus-corpuscles are granular, and the nature of this granulation varies with the constitution of the individual. Coarsely granular, refractive, nearly homogeneous corpuscles, without any apparent nucleus, show a first-class constitution, and the more numerous these are the better is the constitution. The coarse granulation is due to a large amount of living matter, and the less living matter present, the finer will be the granulation, and, therefore, the poorer the constitution. Very finely granular pus-corpuscles, with one or more pale nuclei, indicate a broken-down or poor constitution. If all the different varieties of granulation, from the coarsely granular down to the very finely granular, are present, we can come to the conclusion that we had an originally good, or even fine constitution, which has become weakened by disease, the more so, the

more abundant the finely granular, nucleated bodies are. A short time before the death of an individual the pus-corpuscles break down completely, and become changed to finely granular, irregular masses. These facts can be verified in every case, and will be found to be of invaluable aid in the prognosis of a given case. Care only must be taken not to confound mucous corpuscles, which are always pale and finely granular, and are present in every normal urine, with pus-corpuscles. Mucous corpuscles are normal products of the epithelia, and vary considerably in size and shape; they are, of course, useless in diagnosing the constitution.

Of the three varieties of nephritis, the *catarrhal*, *interstitial*, or *desquamative* form is the mildest and the most common. Clinically, it may escape detection for years, and the microscopical examination of the urine, which may be made with a view of detecting other affections, will often lead to a diagnosis long before the clinical symptoms will show the disease. In the examination of urine a power of four hundred and fifty or five hundred diameters should always be used; a lower magnifying power is unreliable, and a higher power unnecessary. As soon as pus-corpuscles are present in a urine, we know that an inflammation exists somewhere in the genito-urinary tract, and the character of this inflammation can only be diagnosed by the epithelia. In every given case, pus-corpuscles should be taken as the standard from which the nature of the epithelia is judged, since these pus-corpuscles vary to a moderate degree in every case, being comparatively small in one case and comparatively large in another. Kidney epithelia, the most important of all the epithelia in the urine, are one-third larger than pus-corpuscles. If, with pus-corpuscles, we find a number of cuboidal bodies, one-third larger, the diagnosis of a nephritis is plain, since these bodies are the kidney epithelia from the convoluted and narrow tubules of the kidney. In rarer, and usually more severe, cases we also find small columnar epithelia from the straight collecting tubules. Kidney epithelia are never present in a normal urine, and should not be diagnosed unless seen in at least moderate numbers, and associated with pus-corpuscles. Their size is the only means of their identification, the presence or absence of a nucleus having no significance whatsoever. Casts are, as a rule, entirely absent in this form, and if present are found in extremely small numbers, and then we almost invariably see hyaline casts only.

Catarrhal nephritis, as well as the other varieties of inflammation of the kidney, may be either acute, subacute, or chronic. Although the microscopical features will not invariably allow us to come to a conclusion as to the acuteness or chronicity of the inflammation, in many cases a positive opinion can be formed. The presence of red blood-globules is the most important feature in this respect, since these will be seen in larger numbers only in an acute inflammation. The more red blood-globules, pus-corpuses, and kid-

FIG. 1.



CHRONIC CATARRHAL PYELONEPHRITIS WITH ACUTE RECURRENCE.—*RB*, red blood-globules; *F*, fat-globules; *PC*, pus-corpuses, some with fat-globules; *CK*, epithelia from the convoluted tubules of the kidney, some with fat-globules; *SK*, epithelia from the straight collecting tubules of the kidney; *UB*, epithelia from the upper layers of the bladder; *MB*, epithelia from the middle layers of the bladder; *PE*, epithelia from the pelvis of the kidney. (Magn. 450.)

ney epithelia are present, the severer is the case and the more certain we can be of an acute affection. In a chronic nephritis, red blood-globules are either entirely absent or present in very small numbers only. Here, however, we find a varying number of small, glistening, highly refractive globules or granules, partly lying free in smaller or larger groups, partly in the interior of pus-corpuses and epithelia. These are fat-globules or granules, and denote chronicity or commencing fatty degeneration, which in this form is never pronounced. Another valuable aid is the presence of rust-brown needles or plates,—crystals of hæmatoidin. These, when conglom-

erated in variously sized masses, usually lie free; when present in small size, they are often found in the pus-corpuscles and epithelia. They denote a previously existing hemorrhage, and show that the pathological process is not an acute one.

Associated with a nephritis we frequently find larger pear-shaped, more irregular or globular epithelia from the pelvis of the kidney, giving us the diagnosis of a pyelonephritis, and almost invariably still larger epithelia from the middle layers of the bladder, showing a catarrhal cystitis. In some cases in which a pronounced chronic nephritis is undoubtedly present, a large amount of salts, especially uric acid or phosphates, is seen. As a badly diseased kidney can never void salts, the conclusion that only one kidney is affected is then justified.

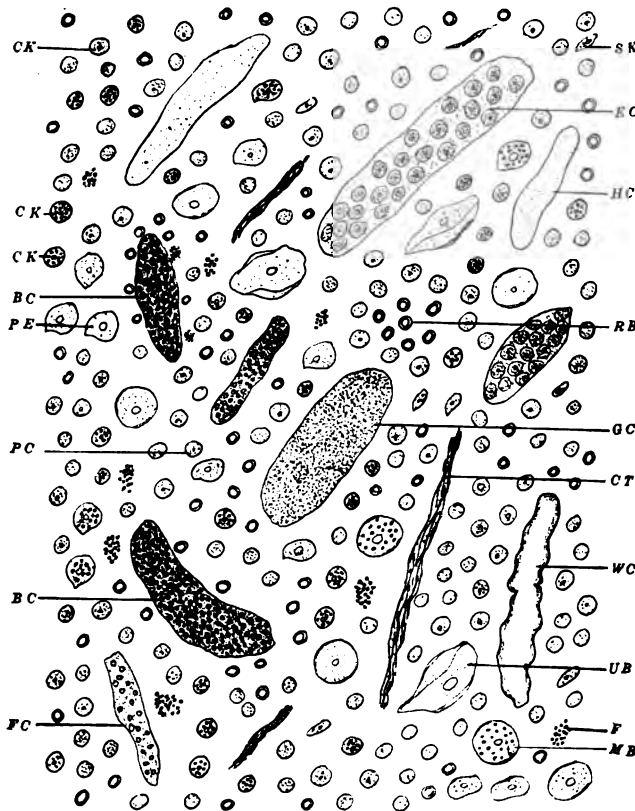
In subacute inflammations, some features of both the acute and the chronic form—that is, a few red blood-globules, a few fat granules and globules, and a moderately good constitution—are found, and then justify that diagnosis.

The outcome of a chronic catarrhal nephritis is always a shrinkage, a cirrhosis of the kidney, the so-called hobnail kidney. The features of this are, a large amount of urine, with a continuously low specific gravity (1012, 1010, or less), a small amount of albumen, absence of all salts, pus-corpuscles, kidney epithelia, fat-globules, and a broken-down constitution. Together with these features, small shreds of connective tissue are also found under the microscope.

Connective-tissue shreds can be considered as among the most important of all features found in urine. They are quite common, and will always be seen in severer and more deeply seated pathological processes, such as severe inflammation, cirrhosis, atrophy, hemorrhage, traumata, suppuration, ulceration, and tumors. Whenever, in a severe inflammatory process, epithelia are shed in large numbers, a certain amount of the surrounding connective tissue will also be cast off, and is found in the urine in shreds of various sizes. The severer the process, the more numerous and larger the shreds. Care must be taken not to mistake them for mucous shreds, which latter are paler, less refractive, and more regular. Connective tissue consists of bundles of varying sizes, of fibrillary, and frequently also finely granular, appearance. Large shreds may even contain bodies resembling nuclei.

Mention must here be made of tuberculosis of the kidney, which most frequently presents the symptoms of severe catarrhal nephritis, with a varying number of connective-tissue shreds. If, with these symptoms, the constitution is broken down or poor, especially when

FIG. 2.



CHRONIC CROUPOUS NEPHRITIS WITH FATTY AND WAXY DEGENERATION OF THE KIDNEY, AND AN ACUTE CROUPOUS HEMORRHAGIC RECURRENCE.—HC, hyaline cast; EC, epithelial cast; BC, blood-cast; GC, granular cast; FC, fatty cast; WC, waxy cast; RB, red blood-globules, numerous; F, fat-globules; CK, epithelia from the convoluted tubules of the kidney; CT, connective-tissue shreds; SK, epithelia from the straight collecting tubules of the kidney; PC, pus-corpuses; UB, epithelia from the upper layers of the bladder; MB, epithelia from the middle layers of the bladder, some with fat-globules; PE, epithelia from the pelvis of the kidney. (Magn. 450.)

tuberculosis exists in other parts of the body, a bacteriological examination for tubercle bacilli must always be made.

The second variety of nephritis—*croupous* or *parenchymatous inflammation*—is a much severer process than the first. The

amount of albumen in these cases is always considerable, and under the microscope one invariably finds casts with the pus-corpuscles and kidney epithelia. In acute cases, blood-globules are also present in large numbers, sometimes so pronounced as to justify the diagnosis of a hemorrhage from the kidney. The number of casts varies with the intensity of the inflammation, being most numerous in severe acute cases. We find the casts in three different and distinct sizes according as to whether they are derived from the convoluted, narrow, or straight collecting tubules. If the smallest variety of casts coming from the narrow tubules is present alone, the inflammation is a comparatively mild one, but if all three varieties are found, the largest coming from the straight collecting tubules, the process is a severe and dangerous one.

There are six varieties of casts which may be found in the urine. These are hyaline, epithelial, blood, granular, fatty, and waxy casts. The presence of these casts at once determines the acuteness or chronicity of the inflammation, hyaline, epithelial, and blood-casts being found only in acute processes, whereas granular, fatty, and waxy casts are symptoms of chronicity. Hyaline and epithelial casts are usually quite numerous in acute croupous nephritis, while the presence of blood-casts depends upon a hemorrhage from the kidney. The more active the hemorrhage, the more blood-casts are we apt to find, and, therefore, the more intense is the affection. In milder hemorrhages these casts are filled with characteristic red blood-globules, and have only very little color, while in severe hemorrhages the casts are crowded with disintegrated blood-globules, and have a characteristic rust-brown color.

Granular casts, which are disintegrated epithelial casts, never occur in acute cases, although in children they may be occasionally found when the inflammation is only a few weeks old. In adults, however, they appear only after the affection has existed for months. Fatty casts always mean a fatty degeneration. In these cases we not only find the casts filled with fat granules and globules, but also see these granules and globules in the pus-corpuscles and kidney epithelia, as well as lying free in larger or smaller masses. Waxy casts denote a waxy degeneration of the kidney, and have a characteristic wavy, fluted contour and usually a yellowish color, with high refraction. The latter two varieties are secondary formations. Combinations of two, or even three, varieties are by no means rare, and

we may have blood-casts with epithelia, waxy casts filled with fat-globules, or granular casts with both fatty and waxy characters all combined.

In chronic nephritis, both of the catarrhal and croupous variety, but especially in the latter, acute exacerbations, which may be due to any mild irritating cause, such as a cold, are frequently seen. In such cases the features of both acuteness and chronicity are combined, and we may occasionally find all the six varieties of casts in one specimen. That these cases must be given a very doubtful prognosis is plain.

Some authors mention still a seventh variety of casts,—viz., mucous casts, or cylindroids,—and insist that these have a pathological significance. This is undoubtedly not the case. Mucous casts are accidental formations of mucus which take on the shape of a cast, and may be seen whenever mucus is present in the urine, both in the catarrhal and croupous varieties. They may easily be differentiated from real casts by their pale, usually irregular outline and finely striated interior, and have no significance whatever.

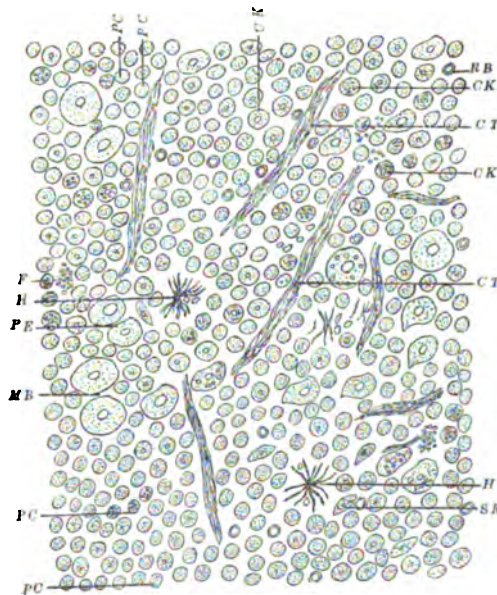
Connective-tissue shreds we may expect to find in croupous nephritis, in almost every case; small shreds only in the milder cases, large shreds in the severer forms. In those acute cases which are accompanied by an active hemorrhage, as well as in the chronic cases, in which a fatty or waxy degeneration has taken place, they are quite common.

The outcome of a chronic croupous or parenchymatous nephritis is, first, an hypertrophy, and then atrophy of the kidney. The features of atrophy are, a continuous low specific gravity (below 1012), a large amount of albumen, absence of salts, pus-corpuscles, kidney epithelia, fat-globules, and granular, fatty, or waxy casts, connective-tissue shreds, and a broken-down constitution. If salts are present with all the other symptoms of atrophy, they are voided from the second kidney, so that we are justified in saying that only one kidney is affected.

Suppurative nephritis, abscess of the kidney, pyonephrosis, or surgical kidney is the most intense of all the inflammations of the kidney. There may be either a number of small, disseminated foci of suppuration, or a large abscess, usually caused by an invasion of staphylococci. The microscopical features are the presence of an enormous number of pus-corpuscles, and many kidney epithelia,

usually with a varying number of red blood-globules, which latter are very numerous in acute abscesses. Besides these, connective-tissue shreds are always found, either in moderate or large numbers. Without such shreds, abscess of the kidney should never be diagnosed, since they alone show a destruction of the kidney tissue. Epithelia from the pelvis of the kidney almost invariably accompany the affection, and frequently casts are seen which denote a

FIG. 8.



CHRONIC SUPPURATIVE NEPHRITIS OR PYONEPHROSIS.—*RB*, red blood-globules; *CT*, connective-tissue shreds; *H*, hæmatoidin; *F*, fat-globules; *PC*, pus-corpuscles, some with fat-globules and some with hæmatoidin crystals; *CK*, epithelia from the convoluted tubules of the kidney, some with fat-globules and some with hæmatoidin crystals; *SK*, epithelia from the straight collecting tubules of the kidney; *MB*, epithelia from the middle layers of the bladder; *PE*, epithelia from the pelvis of the kidney. (Magn. 450.)

complicating croupous nephritis. The abscess may be either acute or chronic. If acute, red blood-globules are numerous; if chronic, they are scanty; but we frequently find crystals of hæmatoidin, sometimes numerous and of large size; fat-globules, both in the kidney epithelia and pus-corpuscles, as well as lying free, are also abundant.

It has been claimed to be impossible to diagnose an abscess from the urine examination, yet such a diagnosis is comparatively easy

if we keep in mind the features just enumerated. It is not even necessary for an abscess to have burst; emigrated pus-corpuscles and the shedding of connective tissue are sufficient for a diagnosis. In abscess of the kidney we frequently find epithelia, both from the convoluted and the straight collecting tubules, the latter often predominating. The number of pus-corpuscles seen must be very large before we are justified in making the diagnosis. Abscess from the pelvis of the kidney is also common. In this case the predominating epithelia will be the characteristic pear-shaped epithelia from the pelvis, with a smaller number of kidney epithelia, the other features being the same.

Abscesses not directly in the kidney substance, but pressing upon the kidney (perirenal abscesses), may also be diagnosed by peculiar changes which take place in the epithelia. These changes consist in the presence of a number of newly formed nuclei, or even pus-corpuscles, in the epithelia,—so-called endogenous new formations. These new formations are caused by the long-continued pressure from without, and in these cases are present, together with the other features already enumerated.

The varieties of inflammation just described cover the whole field of kidney inflammations. Other names than those here mentioned may be used, but are either varieties or subvarieties of the above. Among the latter, inflammation of the glomeruli—the so-called glomerulitis—is the most important, since many pathologists describe it as a separate affection. This is, however, not a separate disease, but is always an accompanying feature of a nephritis, catarrhal as well as croupous.

Of great importance in the diagnosis of kidney lesions are the *anomalies of secretion*. There are persons who will pass large quantities of uric acid and oxalate of lime all their lives, this condition being called lithæmia and uric acid diathesis. If oxalate of lime alone is voided in large quantities, we have an oxaluria. The urine of such individuals usually has a high specific gravity and contains many crystals and concretions of uric acid and oxalate of lime from the calyces and pelvis of the kidney. The so-called renal calculi frequently produce an inflammation of the pelvis of the kidney, a pyelitis, either slight in character, with an accompanying inflammation of the kidney, pyelonephritis, or severe, even causing abscesses of the pelvis and kidney. In these cases we have all the

symptoms of inflammation or suppuration. These concretions often produce a severe hemorrhage, the most frequent seat of hæmaturia being found in the pelvis of the kidney as a result of the concretions of uric acid or oxalate of lime, or both. So-called oxaluria is more often the cause of hemorrhage than is generally supposed.

Besides the affections already described, the examination of urine may lead to the diagnosis of a *tumor of the kidney*, even before the clinical symptoms are sufficiently pronounced to even suspect a new

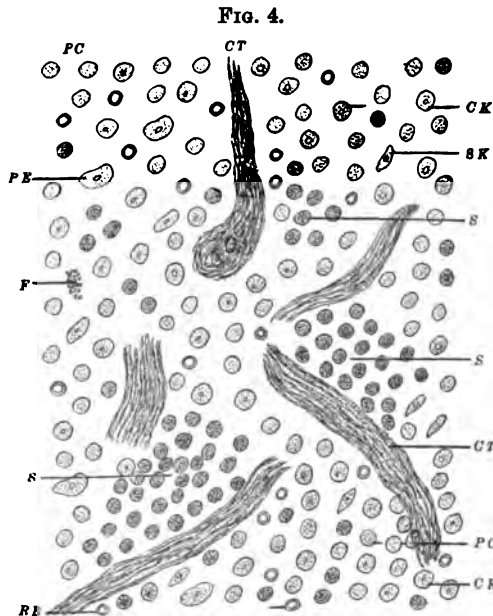


FIG. 4.
SMALL ROUND-CELLED SARCOMA OF KIDNEY.—*CT*, large connective-tissue shreds; *S*, groups of sarcoma-corpuscles; *PC*, pus-corpuscles; *CK*, epithelia from the convoluted tubules of the kidney; *SK*, epithelia from the straight collecting tubules of the kidney; *F*, fat-globules; *RE*, red blood-globules; *PE*, epithelia from the pelvis of the kidney. (Magn. 450.)

growth. Here the presence of extremely large and numerous shreds of connective tissue, with pus-corpuscles and kidney epithelia, may lead us to suspect a tumor without any other features. A positive diagnosis can, however, be made in malignant sarcoma of the kidney, which, though fortunately not common, is of frequent enough occurrence.

The variety of sarcoma usually found in the kidney is the small, round-celled. In these cases, we find, besides numerous pus-corpuscles and kidney epithelia, red blood-globules in moderate num-

bers, and small globular bodies, larger than red blood-globules, but distinctly smaller than pus-corpuscles, without nuclei, coarsely granular, or almost homogeneous, and highly refractive, in large numbers. These bodies are the sarcoma-corpuscles. In contradistinction to these, the pus-corpuscles are here usually finely granular, often nucleated or vacuolated. Connective-tissue shreds are present in large numbers in such cases. These features are absolutely characteristic of sarcoma, and have, in a number of cases, led to the diagnosis of a sarcoma in the kidney before the clinician ever suspected a new growth. The autopsy has proved the correctness of this assertion.

From the description here given it can be readily seen that urinary analysis is of far greater importance than is usually believed. Not only is it comparatively easy to diagnose kidney lesions from the examination of the urine, but it is the only method by which these affections can be correctly diagnosed, since the clinical symptoms are, in many cases, so vague as to simply lead to the unscientific diagnosis of Bright's disease, with which practitioners have usually been satisfied. A scientific diagnosis can only be arrived at by the careful examination of the urine.

THE PRESENT POSITION OF THE DIAGNOSIS OF GASTRIC DISEASE BY CHEMICAL INVESTIGATION.

CLINICAL LECTURE DELIVERED AT THE BERLIN MEDICAL SCHOOL.

BY I. BOAS, M.D.,

Berlin, Germany.

GENTLEMEN,—We have before us this morning the case of the man in whose stomach contents we found lactic acid after a test-meal the other day, with the absence of free hydrochloric acid, as always happens, a combination of symptoms from a chemical standpoint that a year or two ago was set down by many as pathognomonic of carcinoma of the stomach. You remember, too, doubtless, that we decided, from the combination of symptoms presented, that we had not to do with a carcinoma, but with hypertrophic pyloric stenosis. The symptoms of chronic gastritis have existed too long, the course of the disease is too slow, and there is an absence of constitutional involvement and of anything like cachexia in the case that absolutely preclude the presence of a carcinoma.

The case is a very interesting and suggestive one, and gives us the occasion to review the present position of the diagnosis of stomach diseases as far as regards the examination of the stomach contents. As my aim is to be practical rather than theoretical, although the theme might be made scientifically much more complete, I shall confine myself to those constituents of the stomach contents whose determination is easy and valuable for the general practitioner under ordinary circumstances.

The first in order is naturally hydrochloric acid. Of itself alone, despite the almost numberless theories that have been built upon it, its presence or absence is of no special diagnostic importance, and is certainly not pathognomonic of any affection or class of affections. Much as we might wish it to be so, it constitutes no stigma

of disease. It is not like the patellar or pupillary phenomena for nervous diseases, or albumen in the urine for kidney diseases, though at times just these claims have been made for it.

It derives all its diagnostic value from the combination of circumstances in which it is found increased or diminished, and of itself means very little. I have always considered it a mistake to make hyperacidity or lack of acidity (too much or too little HCl) of the stomach contents pathognomonic of any special condition, and further observation and experience have brought most stomach specialists to the same opinion. It is probable that either condition may exist without any organic affection of the stomach at all. Primary motor disturbances of the stomach, for instance, disturb absorption and lead, under varying conditions, to differences of acidity that can scarcely be looked upon as more than functional. Hypersecretion may, by its action on terminal nerve-endings, lead to a reactive lack of acidity. We know too little of the specific etiology of abnormal secretion in the stomach to make its varying conditions pathognomonic of any special pathological condition. Great variations in acidity occur without definite significance, and unless other symptoms accompany the condition they cannot be considered specially abnormal. Affections that have been considered to be so distinctly separated from each other by this very symptom of variation in gastric acidity, as gastric ulcer and carcinoma ventriculi, have, under circumstances that we do not clearly comprehend as yet, a common ground in which distinction becomes impossible, if we are to judge from this symptom alone. While gastric ulcer is usually accompanied by superacidity, cases of sub-acidity are not rare, and while gastric cancer usually causes sub-acidity, a number of cases in which for a time at least there was superacidity have been reported.

At the same time, we must be careful and not set the value of gastric super- or in acidity (*i.e.*, absence of hydrochloric acid) too low, for in conjunction with other symptoms it often forms a most important confirmatory symptom, and one deserving of a great deal of consideration.

Superacidity (HCL over two per cent.) is oftenest a sign of the presence of a gastric neurosis. It may be, however, the manifestation of a benignant hypertrophy of the gastric glands, or may occur as the beginning of a chronic gastritis, so-called "chronic sour

stomach," gastritis acida. It is observed in a notable proportion of cases of gastric ulcer, though this is, as I have said, by no means constant. Where there is found cachexia or considerable emaciation, with a tumor in the epigastrium and other symptoms pointing undoubtedly to cancer of the stomach, and with all this there is free hydrochloric acid present during the digestion of a test-meal, one may conclude, I think without doubt, that the cancer has taken its origin in an ulcer. This hypothesis will often be confirmed on careful questioning of the patient, for it will be found that there is a history of former sharp pains after eating, with hæmatemesis or passage of dark stools.

Gastric subacidity (HCl under one per cent.) does not give so valuable a clue to the condition present as does superacidity. Where constantly found, one must think of subacute or chronic gastritis. It may occur, however, in dilatation of the stomach, gastric atony, or where there is a reflux of bile from the duodenum for any reason. It often occurs in cases of beginning carcinoma, but at a time so early in the disease that there are no additional symptoms on which to found a justifiable diagnosis. Finally, subacidity may be present in ulcer of the stomach or of the duodenum.

Inacidity, a name I prefer to the hybrid compound, anacidity, total absence of free HCl in the stomach contents, is the most frequent symptom of the advanced stage of chronic gastritis. It is also a frequent accompanying symptom of a gastric neurosis. The two conditions may, however, usually be differentiated by the fact that while in chronic gastritis the absence of HCl goes hand in hand with the absence of the ferments, pepsin and lab-ferment, in a neurosis these can usually be demonstrated to be present.

As regards the much-discussed question of the absence of free HCl in gastric carcinoma, I consider that my experience in stomach diseases justifies me in laying down three maxims.

1. *The presence of free HCl speaks against carcinoma*, though of course only when other symptoms are lacking too. If there is an epigastric tumor, emaciation, and beginning cachexia, then it is of no significance.

2. The absence of free HCl establishes the diagnosis of cancer if two of the classical symptoms of cancer, emaciation and tumor, are present. It makes the diagnosis of cancer extremely probable if, besides beginning cachexia, there are symptoms of stenosis of

the pylorus running the clinical course that a cancer in this region usually does.

3. For the differential diagnosis of gastric ulcer from cancer, the presence of free HCl where no tumor can be discovered speaks for ulcer, while the failure to find free HCl is against the diagnosis of ulcer.

Where there is normal acidity,—that is, free HCl between one and two per cent.,—there is usually no tissue-change in the stomach, and, in general, no affection of the stomach itself. Digestive symptoms, often severe, may accompany almost any internal affection, and in such cases the demonstration of the normal acidity of the stomach is of great practical importance in the question of rational diagnosis and therapeutics. Where, however, all the symptoms point to gastric trouble, then normal acidity means the presence of a gastric neurosis. Nervous dyspepsia and chronic glandular gastritis are often extremely difficult to differentiate by any other means than the test of the acidity of the stomach contents. Varying gastric acidity may be noted, so that there may be in successive tests superacidity, subacidity, and inacidity. One or two tests should not then be considered to give the true condition of the stomach contents, and only the constant presence of a particular phenomenon can be counted on for diagnostic purposes. This very variableness constitutes, however, a symptom of gastric neurosis or of a beginning gastritis, though it has been reported, too, as occurring in cases of carcinoma.

As to the best tests for free HCl I shall say very little to-day, as they have occupied us in former lessons. The best qualitative tests are, for practical purposes, the Congo-red and tropæolin tests. The best quantitative tests, and it is the quantitative presence of HCl which has played the prominent part in the diagnosis of stomach diseases in this last ten years, are those in which titration with a decinormal solution of an alkali is employed to determine the amount of free acid present. The indicator is different in different methods, but the simplest and most practical seem to be Mintz's, in which Günzberg's reagent is used as the indicator, or Mörner's or my own method, in which Congo-red is used for that purpose. In all of these methods the organic acids present neutralize a certain amount of the alkali, and so come into the result as HCl, but, as a rule, they are present in such comparatively small quantities that it

makes no appreciable difference in the result. Where they are suspected to be present in larger quantities than usual they may be eliminated by shaking up the material to be tested thoroughly with ether.

This brings us to the tests for, and the significance of, the organic acids. Of these lactic acid is the only one of importance. Certain fatty acids, butyric acid, at times even traces of formic acid, occur in the stomach contents, but in such trivial quantities that their determination has no practical result.

Lactic acid occurs in the stomach contents either because introduced from without or formed within the stomach. Sour milk or buttermilk, as might be expected, contain a good deal of lactic acid, but so does fresh meat, especially muscle and the large glands, liver, lungs, spleen, pancreas, etc. Lactic acid is formed within the stomach by fermentation of carbohydrates. Certain fungi split these up, with the production of lactic acid, among other things. It is this lactic acid from fermentation that concerns us particularly. It may be distinguished from the lactic acid of fresh meat by the fact that it is optically inactive, while that of meat is optically active, but, as a rule, the differentiation is not sufficiently easy and sure for practical purposes.

When testing for lactic acid it is important, above all, to be sure that no lactic acid has been introduced with the food. For this reason the original test-meal of Leube and Rugel, which contained flesh, had to be abandoned as impractical, the distinction between the two varieties of lactic acid being so difficult that it could not be carried out in practice. Moreover, the various kinds of bread contain lactic acid, so that the simpler test-meal suggested by Ewald and myself is unsuitable where exact tests of the formation of lactic acid in the stomach by fermentation are to be made. For this purpose the only proper test-meal is one composed solely of some meal soup. Where gastric stagnation exists, if a litre or so of barley or oatmeal gruel, seasoned only with a little salt, be taken in the evening, and then the stomach contents tested for lactic acid next morning, the results of the test are eminently reliable.

One sometimes reads reports of examinations of gastric contents in which side by side with the presence of lactic acid free HCl is noted. Lactic acid results as the consequence of stagnation of the gastric contents, not three to four hours, but ten to fifteen being

necessary for its formation. At the end of this time no free HCl exists in the stomach, so that the two are not found together. It is true, perhaps, that an examination of the stomach contents almost immediately after a meat meal had been taken might show the presence of both because of the lactic acid in the meat, but not otherwise. With, for example, such a test-meal as that suggested it is impossible.

The simplest and most practical test for lactic acid is Uffelman's reaction with iron chloride. The accuracy and trustworthiness of this test has, as you know, given rise to much discussion, but I consider it, under proper precautions, the most practical one yet suggested. The iron chloride solution should be extremely dilute, about one drop of iron chloride to fifty cubic centimetres of water, so that there is just the faintest suspicion of a yellow color. The test solution should then be divided in two test-tubes, one of which is kept for control color comparisons. To the other test-tube a small quantity of the carefully filtered stomach contents is to be added. If lactic acid is present, a very characteristic lemon-yellow color develops, which once seen is easily recognized again. I take some of the stomach contents of the case before us to-day and add it to the diluted iron chloride solution, and the lemon color is at once developed, as you can easily see. Comparison with the liquid in the other test-tube shows how striking is the color reaction. If, instead of lactic acid, free HCl were present here, the color would be a yellowish brown. I take some of the filtered gastric contents of a patient with a dyspeptic neurosis of not very advanced type and add it to a third test-tube containing iron chloride solution, and you see this brownish-yellow color. Now, comparisons of the three tubes show that the characteristic colors of the three solutions are not hard to distinguish.

Uffelman himself suggested the addition of dilute carbolic acid solution to the iron chloride solution to add to its differential accuracy, but after trying both I consider that the more complicated combined reagent has no advantage over the simple dilution I used in the first test.

Where phosphates are present in large quantities, the iron of the iron chloride solution is thrown down as a white precipitate, and this disturbs the color reaction. In this case the stomach contents should be shaken for a time with sulphuric ether, and then the ether

tested. The ether takes up a certain amount of the lactic acid when it is present, and then gives the characteristic lemon-colored reaction. As a rule, negative tests for lactic acid are not absolutely reliable unless this ether test has been made.

In doubtful cases the aldehyde test is an extremely valuable one. Lactic acid is oxidized to acetaldehyde, and the formation of this substance is detected by the formation of iodoform when a dilute solution of iodine is added to it. I add some aldehyde here to a one per cent. iodine solution that has been decolorized by normal caustic potash solution, and you can see and smell the iodoform for yourselves. Certain precautions and preliminary manipulations are necessary with the gastric contents, but these are not hard to become accustomed to.

Now, as to the significance of lactic acid in the stomach contents. I must say at once it has no mystic meaning, and, much as has been claimed for it in the past, it is not of itself pathognomonic of any condition. Originally I hoped that it was going to prove an absolutely pathognomonic symptom of cancer, but unfortunately my hopes have not been fulfilled. I hoped further that it would make an early diagnosis of cancer possible. By early diagnosis I mean one made before the presence of a tumor could be demonstrated, though of course a good-sized tumor might exist.

I have found, however, after further experience in careful testing for lactic acid, that cases like the one before us to-day gave the lactic acid reaction, though a malignant affection could practically be excluded. We have to do here with hypertrophic pyloric stenosis and the consequent gastric stagnation. In general, where there is stagnation or absence of HCl, lactic acid may be found. The HCl acts as an antiseptic under ordinary conditions in the stomach, and prevents the fermentative processes which usually give rise to lactic acid. Some have even gone so far as to say that this antiseptic function in the stomach and intestines is the main purpose of the HCl.

Despite the fact, however, that lactic acid has lost its pathognomonic significance in cancer cases, it still remains the surest symptom we have in cases where no tumor is palpable. Where only absence of HCl is noted the case remains extremely doubtful unless other symptoms are present, but where there is also noted the presence of lactic acid, then there is more than a strong suspicion of the

presence of cancer. The clinical course of the affection must supply the other symptoms that confirm the diagnosis of cancer.

Before the announcement of the significance of lactic acid the question of the diagnosis of cancer before a tumor could be demonstrated was never thought of. Now there are a dozen cases reported of the early diagnosis of cancer,—i.e., before the appearance of a tumor, where the diagnosis was confirmed on operation. In most of these cases a radical operation was successfully performed.

Where there is, besides the absence of lactic acid, a beginning tumor, then the diagnosis of cancer becomes practically a certainty. Only one case—Rosenheim's—has been reported where the tumor with the presence of lactic acid proved to be a benignant one.

The early diagnosis of gastric cancer is then not yet possible. The development of cancer nodules in their first stage, when operation would be so favorable, gives either no symptoms or no characteristic ones. As happens with cancer in other parts, it is sometimes surprising how far the process has gone before patients consult a physician. Where early symptoms are complained of, they are often of the most ordinary kind,—slight dyspepsia, for which they go to their family physician, often half apologetically. The ordinary acid pepsin treatment is prescribed, often with marked relief to the symptoms. After all, the cancer causes a functional disturbance of gastric secretion, and this treatment supplies materials for digestion that are diminished or absent. After three or four weeks, perhaps longer, the condition becomes worse, and the realization comes that something more than a passing functional disturbance is at work. By this time, too, often the operation is too late. Extensive infiltration with glandular involvement has taken place. It is not that we cannot diagnose carcinoma ventriculi when it gives symptoms of its presence. The slightest sign is often enough to put the modern diagnostician on the track, as the cases in the recent literature of the subject plainly show, but too often it remains absolutely latent during all the time when operative measures are especially indicated and their success almost assured.

The other organic acids are of slight importance for diagnostic purposes, though their study from a scientific stand-point has given us many valuable points as to pathological processes in the stomach, especially the various fermentations. There remain to be considered the ferments or, better, enzymes,—pepsin and lab-ferment.

While it is the custom to talk of them under these names, what we really wish to study and test are the specific products of certain cells and glands in the stomach, one of which, known as pepsinogen, in the presence of free HCl becomes the active ferment pepsin, the other, labzymogen, under ordinary circumstances, in the stomach becomes labenzyme, or lab-ferment, a milk-coagulating agent even in the absence of free acid.

The test for pepsinogen is the simple one of seeing if the stomach contents will digest albuminous substances, digestion meaning the change of insoluble albumoses into soluble substances which dissolve in the liquid present. As pepsinogen does not become the active pepsin except in the presence of free HCl, where the stomach contents are neutral or contain only other acids, a sufficient amount of HCl must be added to make the conclusion reliable. In general, negative results from the test need controlling. Neutral stomach contents, however, even without the addition of HCl, will sometimes be found to be perfectly capable of digesting albuminous material. In such cases, to my mind, there is a question of the presence in the stomach of a mixture of pancreatic juice and bile, and a conclusion may be drawn as to the digestive power of the pancreas in the case, which may be of diagnostic and prognostic significance.

As a rule, when HCl is present, pepsin is always present, though the opposite is not true, as I have said. The test for pepsin may be made by putting ten to fifteen cubic centimetres of the stomach contents in a test-tube and adding some bits of albumen or of fibrin, or some pieces of serum albumen, as I do here, and setting it in an incubator at about the body temperature. If the albuminous substances added have been weighed, a better judgment as to the quantitative value of the pepsin present may be made. In general, however, the quantitative estimation is open to a great many sources of error. The most satisfactory method I have found in practice is the comparison of the digestive power of the stomach contents to be tested, with those of a healthy stomach taken as the norm. For the purpose of the test I collect and preserve the normal stomach contents coming under observation. In ordinary practice the secretion of a hypersecretive stomach may be collected for this purpose. If the time taken for the complete digestion of equal quantities of albuminous materials differs, then I consider the ratio of the digestive capacities of the two stomachs from which the gastric contents

came according to the various times. As one hour to three hours, for example, then the digestive capacity of the second stomach equals one-third.

If no digestion at all takes place, notwithstanding the precaution of adding free HCl and keeping the mixture at the body temperature, then the prognosis of the case is bad. For absence of the ferments means atrophy of the gastric mucosa, and this, of course, is a process of involution that can never be repaired.

Where HCl acid alone is absent, but the ferments present, then we have only a functional gastric affection to deal with, one that is often of only passing importance and that is often rapidly recovered from. Menstruating women will be found very frequently to be without HCl, but their digestion may, nevertheless, be unimpaired. Nervous dyspepsia and gastric congestive conditions may produce the same state of affairs, so that the test for the presence of pepsin may be the best means of differentiating a functional from an organic trouble.

It is to be noted, too, that when I say bad prognosis in cases where the ferments are absent, this means as regards the restitution of the function, but not as regards the life of the patient. As a matter of fact, I know patients in whom stomach digestion has become practically impossible from absence of the elements that make up the gastric juice, and who yet live and enjoy comparatively good health, there being very few symptoms of their condition. The question of stomach absorption of nutritive material is still an open one, but it is probable that most absorption takes place in the intestine, so that while this remains healthy the case is favorable.

As regards the presence of labzymogen or the preliminary compound of the lab-ferment, it may be said in general that when pepsin is present it, too, is present. Its presence may be proved by neutralizing carefully the stomach contents and testing its power of coagulating milk. The milk coagulates in its presence without changing its reaction. Quantitatively the test for labzymogen may be made by diluting the neutralized stomach contents until it is just able to effect coagulation of milk. Normal lab-ferment should bear dilution thirty or forty times in the stomach contents in which it occurs.

The significance of lab-ferment for diagnostic purposes is practically the same as pepsin. Presence of the ferments indicates that

serious tissue-change has not taken place in the stomach; that no pathological process has produced modifications of the gastric mucosa and glands that are beyond repair. Function may be seriously disturbed for the time being, but the important organ itself remains intact.

For the determination of the motility of the stomach I consider that as yet we have no ideal method, but that, of those proposed thus far, von Leube's is the most satisfactory. A moderate meal of meat and soup and bread and water is taken, and six hours after the patient's stomach is washed out. The presence of more than a small amount of particles of food is a sign that the stomach has not its normal motile power for passing food on to the intestine. The test evening meal of some meal soup, with washing out of the stomach in the morning, is extremely simple and gives a good idea of the quantitative disturbance of the stomach motility.

The methods in which the salol reaction in the urine, or the iodine reaction in the urine or in the saliva after the administration of iodoform, I consider untrustworthy. Klemperer's method with oil is too unpleasant for patients, as a rule.

The resorptive power of the stomach has been tested under varying conditions with iodide of potassium, but recent work in the matter shows that no trustworthy conclusions may be drawn from its use. Häberlin's investigations show that the KI test is of no differential significance between cancer and ulcer of the stomach because of the ulceration that occurs so often with cancer. Some as yet unpublished observations of my own in conjunction with Dr. Abele, show that the KI test is of very little import in other chronic affections of the stomach.

What shall I say, then, in conclusion, with regard to the present position of the diagnosis of stomach diseases by chemical investigations? Only this, that so far careful investigations have brought us no pathognomonic symptoms, that we must still consider carefully all the circumstances of the case in order to make a proper diagnosis, and that experience in the handling of cases has not yet been superseded by ready-made tests that make the diagnosis for us.

The chemical tests have, however, completely revolutionized our knowledge of stomach diseases, and made scientific exactness possible where before there was only the most unsatisfactory empiricism. We are far beyond the period when a look at the tongue

was supposed to convey important information with regard to the condition of the stomach. For myself, I have always considered that the tongue, except in fever, meant very little beyond the general condition of the mouth and fauces, though there are those who seem to think that they can gather much more from it.

As to the question whether newer methods of investigation, especially the gastroscope and the X-rays, will take the place for the early diagnosis of cancer which it was thought chemical investigation of the stomach contents would surely hold. I think, without being too conservative, and without belittling methods because they are new and less familiar than the older ones, that I may say candidly they will *not*. The gastroscope has not fulfilled its promise. Practically only the pyloric region can be examined accurately with it; sections of the greater curvature of the posterior wall and of the neighborhood of the cardia are out of its range. The X-rays have given no results so far that are more helpful than those to be obtained from gastroduaphany or the method I introduced of palpation with the sound, and the prospect of improvements in technique bringing more useful results is not very great. Besides, there always remains the latent period of beginning cancer, when there are no symptoms to suggest the use of any diagnostic method.

OXYGEN INJECTIONS FOR ASCITES; PUNCTURE OF THE HEART IN THE COURSE OF PARACENTESIS PERICARDII; FOUR CASES OF INTRAVENOUS INJECTION FOR TOXÆMIA.

CLINICAL LECTURE DELIVERED AT THE JEFFERSON MEDICAL COLLEGE HOSPITAL.

BY H. A. HARE, M.D.,

Professor of Therapeutics and Materia Medica in the Jefferson Medical College,
Philadelphia.

GENTLEMEN,—The cases of which I shall speak to you to-day are rare, and because of the unusual conditions surrounding them and the unusual methods of treatment which were instituted will doubtless prove of interest to you.

The first case is that of a man who is suffering from very severe ascites; his abdomen, as you notice, is tremendously distended by fluid, and that the distention is due to fluid and not to gas is proven by the physical signs which differentiate these two conditions. You notice that I get fluctuation transmitted from side to side, that percussion, excepting over the anterior portion of the abdominal wall, gives absolute flatness, while the shape of the abdominal distention is that caused by fluid rather than by gas. He has been tapped in my wards five or six times, but almost as fast as the liquid is withdrawn it seems to form again, so that within a very few days of doing paracentesis abdominis the patient complains as bitterly of the discomfort produced by pressure as before the operation was carried out. Within the last few weeks, Tessier, a French clinician, has reported to the National Society of Medicine in Lyons the successful application of Potain's method of abdominal puncture followed by injections of oxygen into the peritoneum. The case reported by Tessier is identical in many of its characteristics with the patient before us, for his case was one suffering from ascites and generalized œdema which depended upon cirrhosis of the liver. While there is probably a certain amount of cirrhosis in the patient before us, our patient

differs from that of Tessier in one important respect,—namely, that he has in addition advanced parenchymatous nephritis, which is perhaps more responsible for his anasarca and ascites than is the condition of the liver. In Tessier's case at the first tapping fourteen pints were withdrawn. A second tapping was then performed and followed by the injection of nearly one and a half quarts of oxygen gas. He tells us that the operation was not painful and was followed by no rise of temperature. The fluid did not reappear, the abdominal circumference diminished from one hundred and twenty-eight to one hundred and two centimetres, and the œdema of the lower limbs also disappeared. I propose in the case before us to resort to this plan of treatment, although, to be perfectly frank with you, I can scarcely hope to get as good results as those recorded by Tessier; and even if the results were equally good, we could not be sure that the injection of the oxygen gas was responsible for the improvement, for, as I have pointed out to you in earlier clinics, a single or repeated tapping of the peritoneal cavity and the withdrawal of fluid sometimes results in the cure of the ascites and even in distinct modification of the cirrhosis of the liver. However, this method of treatment is so innocent that there can be no objection to our trying it in this patient, although my belief is that future clinical experience will determine the fact that oxygen injections will prove useful solely in peritoneal effusions which depend upon tubercular infection, for you will remember that allowing the atmosphere to enter the abdominal cavity either by means of an incision or by an injection frequently results in cure in these cases. (Oxygen gas was allowed to flow slowly into the abdominal cavity to the extent of about two quarts,—that is, until there was considerable distention of the belly. The patient complained rather bitterly of pain in the left shoulder-blade, apparently from the pressure of the gas against the diaphragm at its posterior attachment. Otherwise no symptoms were produced by the injection.)

It is interesting to note that this case received absolutely no benefit from this method of treatment, the fluid returning quite as rapidly as it had under previous tapplings when no oxygen gas was injected.

The second case which I wish to report to you is one which has been met by me in private practice and which possesses a number of points of interest. A boy, nineteen years of age, during the course

of a severe attack of articular rheumatism, developed great pain over the præcordium, and in the course of forty-eight hours marked interference with the normal heart-action, dyspnoea, cyanosis, and great præcordial discomfort. He had had since early childhood at varying intervals severe attacks of rheumatism, and as a result of these attacks had developed a marked mitral regurgitant murmur. The symptoms of cardiac oppression increased in intensity, but a physical examination of the chest failed to reveal any trouble with the lungs, although there was a great increase in the area of præcordial dulness. Under these circumstances it was evident that the extension of cardiac dulness in every direction could only be due to two causes: either a pericardial effusion or marked cardiac dilatation. The symptoms increased in severity, and became so aggravated that it was evident the patient would die in a very short time if some active interference was not resorted to. Under these circumstances I decided that I was justified in resorting to paracentesis pericardii, with the hope that by withdrawing pericardial fluid we might relieve the labored action of the heart. After careful percussion and deliberate outlining of the areas of cardiac dulness, I inserted a trocar and canula attached to an aspirating flask into the fifth interspace immediately to the left edge of the sternum. The impulse of the heart was immediately transmitted along the canula as soon as it entered the chest, and on turning the stopcock the aspirator withdrew several drachms of blood. This sign, combined with the active movements of the canula, which was evidently engaged in the heart-muscle, evidently indicated that the heart had been punctured, and fearing that serious results might follow the instrument was at once withdrawn. Instead of the patient becoming worse, however, he immediately improved and for a number of hours seemed much relieved, perhaps because by the withdrawal of the blood I had relieved auricular or ventricular distention and the wound closing had prevented hemorrhage into the pericardial sac. On the following day the symptoms having returned in all their severity, it was determined to once more attempt to withdraw fluid from the pericardial sac, in which it seemed certain that fluid existed. Another attempt, however, was equally barren of results so far as fluid was concerned, the cardiac cavity being tapped a second time and pure blood withdrawn as before. This second wound of the heart, however, also resulted in temporary

amelioration of the case, the patient dying about thirty-six hours afterwards from a gradually increasing cardiac failure.

The last four cases of which I shall speak to you are very much alike. The first is that of a man who you will notice is suffering from such pronounced uræmic poisoning that he is entirely unconscious of his surroundings. He was brought to the hospital this morning from one of the large hotels of the city, where he had been found unconscious and breathing stertorously. His lips are dry and cracked and covered with blood, owing to the fact that he has bitten his tongue in a uræmic convulsion. You will notice his loud uræmic stertorous breathing and the color of his face, and the resident informs me that he has passed no urine since his entrance into the house, and that only about an ounce of urine has been obtained by catheterization, this being heavily loaded with albumen. An examination of his heart shows it to be normal, but to be acting excessively. His pulse is too weak for me to bleed him or to give him pilocarpine, and his condition is too pressing to wait for the results of a hot-pack. I shall, therefore, immediately proceed to inject into his median basilic vein, by means of an apparatus which you have seen me use in a previous clinic, about one and a half quarts of a special salt solution prepared according to the formula of Dr. F. S. Locke. The salt solution which I employ is made in the following manner: into a pint of sterilized water is poured the contents of a small vial, which contains a concentrated sterile saline solution made according to Dr. Locke's formula by Parke, Davis & Company at my request, in order that surgeons and physicians may have at hand the proper proportions and the proper ingredients for the preparation of normal saline solution for intravenous injection on all occasions. This formula contains as its chief ingredients common salt, potassium chloride, and calcium chloride, as these two additions to the ordinary salt solution have been found to render it very much more efficacious. (One and a half quarts of this solution were then injected into the man's vein, and almost before the injection was completed his condition had materially improved, and within a few minutes afterwards he returned to consciousness sufficiently to give his name and address and also the address of his brother. His mind was not entirely clear and did not become so. A few hours after injection he again became unconscious and speedily died in coma.)

This case very well illustrates the temporary revivifying influence of these injections.

I may tell you at this time of another case seen by me in consultation with Dr. Irwin. A man in advanced life was suddenly seized with acute uræmic coma, and twenty-four hours afterwards when I saw him he had beginning Cheyne-Stokes respirations and restless delirium, no part of his body being quiet for a moment at a time. His face was exceedingly flushed and cyanosed, his pulse was moderately weak. It was very evident that the man would speedily die unless something was done for his relief, and under a good many difficulties, arising from the performance of the operation in a private house, I performed transfusion again in this case. However, the disease had evidently progressed so far that no benefit could be produced of any material advantage, for although his breathing became better his cyanosis decreased and he sweated freely, the coma persisted, and he died in about thirty-six hours. I think, however, that the injection prolonged his life, which in his case may not have been of material advantage, as consciousness did not return.

Another case I mentioned to you immediately after I performed transfusion upon him. It was that of a man of sixty who had been suffering from marked uræmia for a period of ten days prior to the time I saw him. The uræmia had been sudden in onset and he had been semicomatose for that period. When I arrived at his bedside it was only by great effort that we could get any response to show even that he heard that we were speaking to him by making some intelligible sound. As nearly everything had been done for him in the ordinary ways, saline transfusion was resorted to, the family having been told that the patient would certainly die within a few hours in his present condition. Two hours after the temperature rose several degrees, a severe rigor came on, as so frequently happens in these cases, and for a time it seemed as if the patient had been made worse by the operation. At this time, however, he broke forth into a drenching sweat, and from that time to this, which is a period of about six weeks, he has steadily improved, being able to be about the house at this time and to attend to a small amount of business. His family naturally regard the case as being one in which the patient was practically raised from the dead.

I think these three instances illustrate pretty well what we can expect from intravenous injection in uræmia,—namely, that they

will save a proportion of the cases, provided that the renal lesions are not already so severe as to make temporary recovery absolutely out of the question, and that if they are very severe, it may produce temporary return to consciousness, or at least a modification in the severity and depressing character of the symptoms. Certainly good results have been obtained in a condition which otherwise is almost hopeless, and the fact that this method of treatment has no evil consequences justifies us in using it in all cases of uræmia where manifestations of toxæmia are severe. I desire in this connection to report a fourth case, which while it does not reflect much credit upon this method of treatment should perhaps be placed on record. A man of fifty-eight, who had suffered for many years with an enlarged prostate and who probably had secondary dilatation of his ureters and disease of the pelves of his kidneys (septic infection), was seen by me in consultation with Dr. H. A. Slocum, who recognized the fact that the patient was desperately ill. When the patient was seen he had the peculiar pallor and anæmia of advanced septicæmia. His face was sunken and almost Hippocratic. He was picking at the bedclothes, and as Shakespeare would express it, he was actually "babbling of green fields" and trying with all his strength, which was very little, to get out of his bed to walk. These symptoms you will learn to regard as pretty sure precursors of immediate death. As there was a large amount of pus in his urine and the entire aspect of the case was septic, and as no operative procedure upon the bladder was considered justifiable, it was agreed to do saline transfusion as his only chance. After the operation, which was performed by Dr. T. S. K. Morton and myself, his condition seemed to be ameliorating, but this improvement was only temporary, and forty-eight hours later he died from septicæmia and asthenia.

THE FREQUENCY AND CURABILITY OF TUBERCULOSIS.

CLINICAL LECTURE DELIVERED AT THE HÔPITAL DES ENFANTS MALADES.

BY PROFESSOR GRANCHER, M.D.,

Professor of Clinical Medicine in the Faculty of Paris; Member of the Academy of Medicine, Paris, France.

GENTLEMEN,—The frequency of tuberculosis is undoubtedly far greater than is usually believed. We have accustomed ourselves to estimate this frequency by the official tables of mortality published in different cities and countries; but however great in these statistics may be the percentage due to tuberculosis, it is still nothing as compared with the enormous number of cases that do not end fatally. You will appreciate the truth of this remark if you compare the mortality of tuberculosis in the official statistics with the mortality of the same disease as shown by certain documents that I am about to lay before you.

According to the official statistics the total mortality in France from all causes is twenty-two per one thousand per year; of this number, three or four deaths are due to tuberculosis, or about one-sixth of the total number of deaths. On the other hand, sixty per cent. of the bodies opened at the morgue contain tubercles, and yet these post mortems are not made after illness, but on individuals who have met with a violent death, usually in a state of good health; so that we might be authorized in thinking that this figure—sixty per cent.—is not very far above the proportion of tubercular individuals in certain classes of the population of Paris.

M. Picini obtained very similar figures by following another method,—the examination of the bodies of persons who had succumbed to diseases other than tuberculosis. Taking the ganglia in such cases, he made an antiseptic pulp with them and used it in inoculating guinea-pigs, with the result that forty per cent. of these animals died of tuberculosis.

From these facts we see that the ubiquity of the bacillus of tuberculosis is so great that one individual out of every three has it somewhere in his body; and although out of one thousand persons only three or four die from tuberculosis per annum, there are upward of three hundred and fifty of them who are tubercular, by which term I mean have Koch's bacillus somewhere in their organism, although it may give rise to no symptoms whatever.

Again, look at the children in all classes of society, but especially in the poorer classes. What a number of them show signs, slight ones, possibly, but still evident ones, of scrofulo-tuberculosis! Certainly a good half of them. Legroux used to say of the children that come to the hospitals, that they were all tubercular. I should say nearly all; and yet many of them grow up, become adults, or even middle-aged or old persons, just like any one else.

Finally, can we not, each one of us, look at the persons whom we know personally around us, and name a number of them who during their childhood or youth had a suspicious, that is to say, tubercular, case of bronchitis, pneumonia, or pleurisy?

We are, therefore, warranted in saying that the death-rate from tuberculosis is trifling as compared with the number of individuals who are tubercular, and this proves the truth of my favorite proposition, which seems paradoxical from being in direct opposition to the opinion that has ruled supreme since the days of Laënnec, and which I repeat all the more freely because it is true and consoling: "Of all chronic diseases, tuberculosis is the most curable."

The extreme frequency of this disease is not confined exclusively to large towns; the country districts suffer cruelly from it in many regions, though from this point of view there are wide differences between the different parts of France. I have made a careful inquiry in two departments with which I am closely connected,—the Creuse and the Côte d'Or. I have interviewed the local physicians, who are in an excellent position to estimate the sanitary condition of their region. In the Creuse there is not a hamlet, not a group of houses, into which tuberculosis has not penetrated; on the other hand, in the Côte d'Or this disease is rare, but then the Côte d'Or is a rich country, where the peasants have big houses with large rooms, and where the conditions of life are easy, whereas the Creuse is a poor country from which the inhabitants emigrate, between thirty and thirty-five thousand going each year to Paris, where

many of them contract tuberculosis and bring it back to their homes. The difference in the sanitary condition of the two regions is therefore easily accounted for by the social conditions.

In the country, then, as well as in the cities, it is unquestionable that the number of deaths from tuberculosis is relatively small when compared with the number of tubercular persons. In my opinion, therefore, the spontaneous cure of tuberculosis by the help of natural forces alone is the rule. Let us see in what way this cure is effected.

Two things have to be considered,—the action of the bacillus on tissues, and the action of its toxin, or tuberculin.

You are all familiar with the characteristics of Koch's bacillus, of which the principal one, which was seen as early as in 1882, when the bacillus was discovered, is its resistance to coloration and its equal resistance to discoloration. This is a micro-chemical characteristic of the greatest importance, which, with other peculiarities in its methods of evolution, gives us a very fair idea concerning the constitution of this bacillus. It enables us to suppose that the substance of this microbe is isolated by an exterior covering very hard to penetrate. This sheath prevents the tubercular bacillus from being easily influenced by external media, and, on the other hand, it enables the microbe to retain for a long time, even when dead, the substances it secretes.

When it gains access to the organism of man the tubercular bacillus immediately sets up cellular reaction in the tissue in which it finds itself, and this reaction ends in the formation of a tubercle. This process does not depend solely on the vitality of the tubercular bacillus, as, curiously enough, dead bacilli cause the same local effects as living ones. The result depends not on the bacillus itself, but on its secretions.

The disease caused by an injection, into the tissues of animals, of dead bacilli (necrotuberculosis) has been carefully studied in a number of laboratories. The only difference between it and living tuberculosis appears to be that its lesions are confined to the spot where the injection is made, and do not become generalized, since the dead bacilli do not multiply; but as regards the localized process, it is exactly the same as would take place around some living bacilli.

These facts would be incomprehensible if we did not believe that even after death the bacilli retain the active substance they secrete during life, as tuberculin, and which they only yield very slowly on

account of the obstacle to its diffusion presented by their sheath or covering.

It is therefore satisfactorily demonstrated that the local reactions are due to tuberculin, and that the danger lies in this tuberculin and not in the bacilli themselves; so that to cure tuberculosis it would not suffice to destroy all the bacilli contained in an organism, but we should also be obliged to remove their dead bodies as well, which is manifestly impossible. We must therefore direct our efforts against the tuberculin, and we shall have found a means of curing the disease when we shall know of a substance capable of neutralizing the harmful action of this tuberculin,—that is to say, a tubercular antitoxin.

It seems probable that necrotuberculosis is not alone an experimental disease, but that it often occurs in nature. The greater part of the bacilli that are floating about with the dust have undergone solar exposure, desiccation, or putrefaction, which are all processes which quickly destroy the power of the bacilli to vegetate. Consequently, although the great resistance of Koch's bacillus to destruction has been repeatedly demonstrated, it is fair to assume that the atmospheric air (we are not speaking of the air in a consumptive's room, where the sun has not free access) contains but few virulent bacilli. They are nearly all either dead, or else their virulence is diminished, and it is logical to infer that it is these weakened bacilli that cause the cases of indefinitely localized tuberculosis of the skin and bones, and undoubtedly many of the benign forms of visceral tuberculosis as well.

This is a first form of tuberculosis which does not kill. In other cases the bacillus enters the organism alive, but soon perishes in it. It has been shown that the greater number of bacilli found in tubercular sputa, or even in the lungs of consumptives at post-mortem examination, are dead bacilli. They have been killed by the organism, and this was to have been foreseen, as for one tubercular person who succumbs, what a number live with their disease! There occurs, therefore, in the organism a curative process anatomically represented by the tubercle itself, with its twofold destructive and restoring tendency.

The histogenesis of the tubercle is still under discussion. Two opinions are held on the subject: the old one, which, in the formation of the tubercle, attributes the chief part to the fixed cells of the

tissue in question, whatever that tissue may be; the other, more modern, claims that the migratory cells only take part in the histogenesis of the tubercle, and that all the cells of which it is composed are derived from the leucocytes or are modified leucocytes. Without siding with either opinion, and only to give you an idea of what occurs, I shall give you a brief description of the formation of a tubercle. The cellular reaction comprises three phases.

In the first, the bacillus, whether it has come to a halt in a vessel, or has been carried through a vessel by a white globule, undergoes the onslaught of the polynuclear leucocytes, whose purpose is to surround and destroy the bacillus. This end, however, which they accomplish in the case of a large number of other microbes, is not reached with the tubercular bacillus, which is able to resist, no doubt owing to its protective sheath, and which also, by means of its tuberculin, destroys a large number of the phagocytes that have attacked it.

In a second phase, the fixed cells of the tissue enter into action, and their activity is shown by the quantity of forms of karyokinesis we perceive; but they are no more successful than the foregoing in destroying the bacilli, their efforts resulting only in the formation of a barrier about them.

The third phase commences with the arrival of the large, mononuclear leucocytes, destined, no doubt, to reinforce the fixed cells, to aid and supplement their action, and also to surround those that have fallen in the struggle.

The result of these intense, cellular reactions is the formation of a tubercular follicle composed of epithelioid cells and of one or several giant-cells.

Whether these cells originate in the leucocytes or in the fixed cells is more or less a matter of indifference to us; the point that does interest us, however, is to see that the organism does not retreat in the face of the bacilli, but produces these defensive cells and fights with great energy.

Whatever may be one's opinion concerning the two theories, there is one point on which they both agree, and that contains the whole of the hygienic therapeutics of tuberculosis; it is, that the result of this cellular activity is the formation of a fibro-caseous neoplasm, the caseum in the centre, containing the bacilli, and surrounded by a fibrous envelope, tending to isolate them from the rest

of the organism. This fibroid process is the curative process, to which I attach so much importance that I include it in every definition of a tubercle.

When, in 1878, I first defined the tubercle as a fibro-caseous neoplasm, its definitions varied considerably. The majority of authors at that time considered it a neoplasm of low vitality, incapable of organization; but the truth is just the contrary, as I proved that every tubercle carries with it, histologically, the beginning of its cure.

To invade an organism the tubercular bacilli can follow any path, and even penetrate through a healthy mucous membrane. It is usually said that an inflamed mucous membrane affords an easy entrance for the bacilli, and that bronchitis, for instance, favors pulmonary tuberculosis. I do not know how this may be, as it would seem that the constant throwing off of the bronchial mucus would carry the bacilli away. In any case it is certain that a previous inflammation of a mucous membrane is not obligatory, and that the bacilli can, and often do, penetrate through a healthy mucous membrane.

The mucous membranes most accessible to the dust of the air are those of the nasal fossæ and larynx, and it was shown not long ago that the tubercular bacillus is frequently found on their surface. The presence of Koch's bacillus was detected once out of three or four times, by inoculations, in the nasal fossæ of men who were in good health but who were in frequent contact with consumptives (students and nurses). They were living bacilli, as they produced generalized tuberculosis in guinea-pigs; yet the persons on whom they were found were in a perfect state of health. The nasal mucus is a precious element of defence against these bacilli, either by sweeping them away mechanically, or by means of its microbicidal properties.

It has also been found that guinea-pigs, when inoculated with fragments of hypertrophied tonsils or of adenoid vegetations, become tubercular once in ten times. Whether these bacilli vegetate on the surface or in the depths of the tonsils, it is certain that tuberculosis can invade the organism by the way of the tonsils. The cervical glands then become tubercular, the disease follows the lymphatic chain, reaches the tracheo-bronchial glands, and finally, later on, becomes generalized.

In the same way the disease can enter the organism by the intestines. The mesenteric glands are then first affected, whether the intestine is diseased or not, and the disease gradually spreads to the liver, spleen, peritoneum, and to the entire body.

In all these cases, before becoming generalized, the bacillus remains for a length of time that varies, but that is often indefinite, localized to the lymphatic system. With tuberculosis, as with syphilis, the disease first affects the glands and then the whole system. This phase is an important one to understand, as these glandular cases of tuberculosis represent the greater number of curable forms of the disease. Sometimes they get well spontaneously; at any rate, they denote a period of halt in the disease which may for a long time remain confined to the glands.

Of all the tissues of the organism, the lymphoid tissue is the one that resists the best. The gland swells and becomes enormous in some cases, but so long as it does not soften it is not a source of danger to the patient. Recovery by sclerosis may occur, even after the caseous process has begun; a fibrous barrier is then formed between the caseum and the healthy tissues. The glands often become chalky, and among the particles of chalk can be found the bodies of the dead tubercular bacilli.

Other tissues act in very much the same way, the bones and joints, for instance; when tuberculosis appears in them it has a strong tendency to remain in place and to get well spontaneously, or with unimportant therapeutical means. These tissues react exuberantly and form very abundant granulations, which no doubt take an important part in the attenuation of the virulence of the bacilli.

The connective tissue sometimes reacts in the same way, and subcutaneous, tubercular abscesses, even more so than purulent effusions in joints, get well after a simple puncture, followed or not, as the case may be, by an injection of iodoform and ether. In the case of a child, I saw cured in two weeks by this method an enormous subcutaneous abscess that had loosened the skin of the entire calf of the leg; it contained two litres of pus, and after the puncture the skin, which was extremely thin, remained quite loose. In two weeks, however, adhesions had formed, the child made an excellent recovery, and is to-day a perfectly healthy man.

Serous effusions in the pleural or peritoneal cavities are also spontaneously curable forms, and nothing would be more benign

than tubercular serous pleurisy were it not constantly in connection with tubercular lesions of the lungs. You also know what surprising results can be obtained from the surgical treatment of tubercular ascites; if the abdomen is opened and the liquid evacuated, the patient recovers. Such cases are very common, and I well remember a little girl I took care of, who had tubercular ascites with rapid development, fever, and cachexia. Laparotomy was performed, and the peritoneal surface was found to be red and granular, with vegetations of both the parietal and visceral folds. Small fragments of these vegetations were removed and used in inoculating animals, which rapidly died from bacillary tuberculosis. Yet the child made a good recovery; five years have since elapsed, and she is now a strong, healthy young woman.

The success of laparotomy in these cases seems marvellous and inexplicable. I think that it only acts by making a complete evacuation of the peritoneal effusion and by thereby preserving the system from absorbing the tuberculin in it. When left to their own resources after such an operation, followed by a thorough washing out of the peritoneum, the bacilli are powerless to produce a new supply of tuberculin, are overcome by cellular activity, and tend to recovery. This may be the explanation of the benign nature of most cases of tubercular pleurisy and hydrarthrosis, and the efficacy of puncture and evacuation in all cases where the bacilli have produced a large quantity of tuberculin dissolved in the liquid of the effusion.

Even in pulmonary tuberculosis there are forms that are spontaneously curable. You know that our predecessors used to distinguish three great classes of phthisis,—scrofulous, arthritic, and florid. The last form only is serious, as it takes the form of galloping consumption. On the other hand, tuberculosis in arthritic patients is often very light. We have no exact knowledge as to what an arthritic temperament really is, but we know that it corresponds to a tendency on the part of the organism to manufacture fibrous tissue and to get well.

Finally, pulmonary tuberculosis in scrofulous patients has a slow evolution, like that of localized tuberculosis, and it would seem as though, in such cases, the previous, glandular tuberculosis produces a certain degree of vaccination of the organism against the bacillus or its toxins. M. Marfan thinks that any person who has had, in infancy, scrofulous glands, and who has entirely recovered

from them by the age of puberty, is definitely protected against tuberculosis. Without being quite so affirmative as this, I think that his opinion is true to a certain degree. There is no doubt that the longer a form of tuberculosis has lasted, the more benign it seems for the patient; this does not depend on any attenuation of the bacillus, which demonstrates its virulence on the persons infected by the patient. I know a man who married four healthy women in succession, and gave tuberculosis to each one of them, from which they quickly died, whereas he himself still lives! If he does so, it is not owing to attenuation of the bacillus, but to the fact that his organism has been accustomed to its action. However inexplicable this may be, it is true, and has been demonstrated experimentally.

To sum up, the more one studies the question of tuberculosis the more convinced one becomes that the action of the organism is preponderant in the evolution of the disease. Phthisis is very often spontaneously curable; it is only rapidly and fatally mortal in a predisposed organism. This predisposition consists in deterioration of the system in one way and for one reason or another,—privations, chronic complaints, dyspepsia, intellectual or physical exhaustion, the alcohol habit, syphilis, or protracted convalescence following infectious diseases. Every one of these causes can place the organism in a condition of inferiority and make it unable to resist the bacilli which are around, on, and in us.

I saw die from a very rapid form of tuberculosis a young woman of splendid constitution, without tubercular antecedents, who, in order to grow thin, took it into her head to eat only sweets and to play lawn-tennis all day. In spite of all she was told, a few months of this regimen brought her to such a stage of exhaustion that she contracted galloping consumption and died before my eyes.

Never, therefore, lose sight of this fact: tuberculosis is only fatal in debilitated organisms. On the contrary, a person who becomes tubercular in a good state of health does not allow himself to become invaded by the bacillus without a deadly struggle, from which results a prolongation of the attack, a stationary condition, or even a recovery from the disease. The means employed by the organism to overcome the bacillus is to isolate it in fibrous tissue; but an organism can only have the necessary resources to supply this material if it is kept in a satisfactory condition of health. Whence the conclusion, which may appear trivial, but which is the exact translation of reality, the best remedy for tuberculosis is good health.

A CASE OF TUMOR OF THE KIDNEY.

CLINICAL LECTURE DELIVERED AT GUY'S HOSPITAL.

BY W. HALE WHITE, M.D.,

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GENTLEMEN,—The patient whose case we will consider to-day is a woman, aged forty-eight, who was admitted into Miriam Ward on July 5, 1897, because she had an abdominal tumor. I have abstracted the following account of her case from the careful report by Mr. H. T. Hicks. There is nothing noteworthy in her family history, and, except that two years ago she began to suffer from varicose veins, she herself has been quite well until December, 1896. She says that then she had pneumonia and congestion of the liver. She first noticed the tumor three months ago; it was at that time below the right ribs and more to the front than the back of the abdomen. It has gradually increased until it has attained its present size; there have never been any sudden variations in its bulk, and she has never had any pain in connection with it. Menstruation has always been normal; she reached her climacteric about six months ago. As far as she knows, there has never been anything wrong with her urine.

Condition on Admission.—She looks well, but says she has lost weight considerably. The lungs, heart, and alimentary canal seem perfectly healthy. Temperature, 98.6° F.; pulse, 86.

Examination of Abdomen.—There is an evident fulness on the right side of the abdomen; the superficial veins are dilated on both sides, but more so on the right than on the left. A large hard tumor can be felt, both back and front, in the right side of the abdomen. It is somewhat crescentic in form, with the concavity towards the middle line and convex at its postero-external boundary. Its upper limit passes beneath the margin of the ribs, its lower reaches within about a quarter of an inch of the iliac crest. The anterior limit is

easily defined, and extends across the middle line about one and a half inches above, and nearly to the middle line below. Posteriorly it fills the right lumbar region. From the spine behind to the umbilicus in front the enlargement measures on the right side twenty and a half inches, on the left nineteen inches. The tumor feels firm, hard, and nodular; there is no fluctuation, nor is there a thrill; there is no pain on manipulation. With one hand in front and the other behind the tumor, it can be moved backward and forward for about half an inch. It moves downward for about half an inch when the patient takes a deep breath. When she is in the hands and knees position, it does not fall forward. The liver dulness, which is normal as regards its upper limit, is continuous with that of the tumor below, and the edge of the liver can be felt separate from the tumor. In front of the tumor is a large area of resonance; its size varies on different days, and sometimes the colon can be rolled about under the hand as it lies on the surface of the tumor. Behind in the lumbar region the tumor is quite dull. The urine is acid, and has a specific gravity of 1005. It contains albumen, a moderate amount of pus, and a very little blood. It was centrifugalized, and pus-cells and red blood-corpuscles were easily seen, but no tubercle bacilli or hydatid hooklets could be found. A vaginal and rectal examination revealed nothing abnormal.

A few days after she came in an exploring needle was put into the dull part of the tumor. Blood was withdrawn; no malignant cells or any urinary constituent could be found in it. Her condition did not change, and she left the hospital at her own wish on July 17.

The first thing we had to do was to make out what the tumor was. In this case that was not difficult, but sometimes it is not easy to decide what such tumors are, and it may be that you will have to diagnose between all of the following:

1. *Tumor of the Kidney*.—In favor of the tumor in this patient being one of the kidney we had (a) its position, (b) its shape, (c) the resonance in front and the dulness behind, (d) its fixity, even when the patient was on her hands and knees, (e) its moving with respiration, showing that it was attached to the liver, and (f) the blood and pus that we found in the urine.

2. *Ovarian Tumor*.—You must never forget to think of this in every case in which in a woman there is a tumor of the abdomen.

In this particular patient all the points in favor of the tumor being renal were against its being ovarian, and, further, we could feel that it did not descend into the pelvis, and the vaginal and rectal examinations revealed nothing abnormal.

3. *Fibroid of the Uterus*.—This, too, should in women ever be present in your mind. Here, too, all the points that were against the tumor being one of the ovary are against this diagnosis, and there are no other symptoms of a fibroid of the uterus.

4. *A Tumor of the Suprarenal Body*.—These are not common, but they may be very large. The tumor in one case was too low down in the abdomen, and its shape was so unlike that of a tumor of the suprarenal that we easily decided that this diagnosis was not possible.

5. *Aneurism*.—The tumor in this patient is obviously too large for an aneurism, and it is in the wrong position.

6. *A Retroperitoneal Cyst or Tumor*.—I once saw a girl with a tumor in this region. Her doctor, a surgeon who was called in, and I, both thought it was renal, but it turned out to be a hydatid behind the kidney. In the patient we are discussing the shape of the tumor, its movement with respiration, and the state of the urine are all against this diagnosis.

7, 8. *Pancreatic or Mesenteric Cyst*.—All the points in favor of the tumor being one of the kidney are against these diagnoses.

9. *Peritoneal Cyst*.—Sometimes, as a result of chronic peritonitis, large localized collections of fluid take place, but here again all the points in favor of a tumor of the kidney are against such a view.

10. *Appendicitis*.—I only mention this to remind you that inflammation connected with the appendix is particularly prone to spreadings behind the peritoneum, so that pus collects behind the right kidney. Nearly all perirenal abscesses on the right side have their origin in the appendix. There was nothing in favor of this view in our case.

11. *Spleen*.—If the tumor had been on the left, we should have had to consider whether it was splenic.

12. *Extra-uterine Fætation*.—There was no possibility of this diagnosis in this case, but the results of a mistaken diagnosis are so serious that you ought to train yourselves never to forget the pos-

sibility of this whenever you are examining an abdominal tumor in a woman.

You will see, therefore, that we had no difficulty in deciding that the tumor was one of the kidney, and we will therefore now pass on to consider the kind of renal tumor from which this woman was suffering. This tumor of the kidney might be any of the following:

1. *A Malignant Tumor*.—In favor of this diagnosis we have (a) the hardness of the tumor; (b) the irregular bosses on it; (c) its solid feel; (d) the absence of thrill or fluctuation; (e) the patient had wasted somewhat; (f) there was some blood in the urine; (g) the tumor was fixed.

Against the view that the tumor was malignant the following points were urged: (a) the patient looked well considering the enormous size of the tumor; (b) there was no pain; (c) the tumor was not tender; (d) there was no evidence of any secondary deposits anywhere in the body, although the primary growth was so large; (e) malignant disease of the kidney is rare in adults; (f) sometimes it is preceded by renal colic, the stone acting as an irritant and perhaps leading to the cancer, but there was no such history in this case. I shall presently point out that most of these points are not so much against the diagnosis as they at first sight seem to be.

2. *Hydronephrosis*.—You all know that by this we mean the condition produced when there is some obstruction to the flow of urine, and consequent retention of it in the pelvis of the kidney. By this means an enormous cyst may be produced. It is said, in the celebrated case of Mr. Glass, to have contained thirty gallons of fluid. For the hydronephrosis to be big the obstruction must be in the ureter. It may be due to some congenital malformation of the ureter, a calculus impacted in it, the healing of an ulcer produced by a calculus, inflammatory thickening at the base of the bladder, or a tumor pressing on the ureter. In favor of the view that our patient was suffering from hydronephrosis there was the large size of the tumor and the fact that she did not look as if suffering from malignant disease. But against this view we had the following points: (a) the tumor was very hard; (b) there was no thrill or fluctuation; (c) bosses could be felt on it; (d) there was no history of its becoming large, getting small again, and becoming large again. This happens in some cases of hydronephrosis, for when the pressure behind some forms of obstruction becomes very great the tumor

suddenly disappears and a large quantity of urine is passed. Gradually the hydronephrotic tumor again forms and again suddenly discharges itself; (e) the blood in the urine.

3. *Congenital Cystic Disease*.—This is a condition in which the kidneys are found full of cysts, and it is often associated with other congenital defects and with cysts of other organs. I have seen them in the brain, lungs, liver, and pancreas. This form of cystic disease of the kidney is usually associated with the formation of cysts elsewhere, especially in the liver. The cysts in the liver appear to be due to vacuolation of the hepatic cells, while those of the kidney are retention cysts of the renal tubules. The cases which occur in children are undoubtedly congenital, but when these cysts are first detected in adults some authorities think the cysts may have developed after birth.

One case did not fall in this category, for the tumor was of rapid development, not lobulated, and congenital cystic disease of the kidney is usually bilateral.

4. *Chronic Bright's Disease*.—Sometimes in this disease the small cysts so commonly seen in the kidneys of persons dead of it have become very large. Bright himself gives some excellent examples.

Our patient was not suffering from this disease because the tumor was far too large; it was not lobulated, and cystic disease is bilateral. Occasionally large solitary cysts—it may be as big as an orange—are seen in the kidney. They are probably retention cysts. The tumor in our case was obviously not one of these.

5. *Hydatid of the Kidney*.—Against this diagnosis there is the extreme rarity of hydatid of the kidney, the fact that the tumor did not feel like it and gave no thrill, and also the fact that we could find neither membranes nor hooklets in the urine.

6. *Tubercular Disease of the Kidney*.—Against this diagnosis we have the fact that the tumor was altogether too large; tubercular disease of the kidney is nearly always bilateral. No tubercle bacilli could be found in the urine, and there were no general signs of tuberculosis.

7. *Pyonephrosis*.—Our patient could hardly be suffering from this, for her tumor was far too large; no fluctuation or tenderness could be made out, and there were no general signs of suppuration.

In considering the above diagnosis I have only mentioned such

points against each as were sufficient at once to put it out of count, and we went over them all before the exploring needle was put into the tumor.

The outcome of our consideration of the case was that until the urine was examined we thought the diagnosis lay between hydro-nephrosis and a morbid growth, but the blood in the urine made the latter diagnosis certain.

There are three forms of malignant disease of the kidney,—(a) secondary sarcoma or carcinoma; (b) primary sarcoma; (c) primary carcinoma.

(a) *Secondary*.—Secondary nodules of growth, whether carcinoma or sarcoma, may be found when the primary growth is anywhere in the body. They are usually small nodules scattered about in the kidney; they cause no symptoms or physical signs, and are unsuspected until found on post-mortem examination.

(b) *Primary Sarcoma*.—These remarkable tumors are almost entirely confined to children under six years old. They are often enormous, and may weigh as much as thirty-one pounds, and really, as the child is much wasted, it almost looks as though it were an appendage to the tumor. They are congenital, but their mode of origin is not certainly understood; they occasionally contain striped muscle-fibres. The mortality of operations for their removal is so high that many surgeons prefer not to attempt it.

(c) *Primary Carcinoma*.—This is usually encephaloid. The tumor retains the shape and position of the kidney; it is often very large, and has been known to weigh twenty-seven pounds, but it is never as heavy in proportion to the weight of the whole body as sarcoma of the kidney frequently is. It often adheres to adjacent organs, and implicates them. The ureter is usually blocked by growth, clot, or *débris*; the renal veins are usually filled with the growth, and the tumor may, of course, ulcerate, suppurate, and bleed in various directions. It is almost always confined to one kidney, and each kidney is affected an equal number of times. The most frequent seats of secondary deposits are the glands in the hilus of the kidney, the mesenteric glands, and the vertebral glands. Women are affected more commonly than men in the proportion of two and a half to one; often calculi are found in the growth. The two very important symptoms of carcinoma of the kidney are the presence of a renal tumor and blood in the urine. A patient hardly ever dies

of carcinoma of the kidney without a tumor having been detected during life. We have already gone over the characteristics of the tumor. Blood is present in the urine at some time or another in about half the cases, and therefore you must not assume that the patient has not got a carcinoma of the kidney because the urine is free from blood. Hæmaturia may be very profuse; usually it is intermittent. Albumen is often present even when there is no hæmaturia; it may indicate that the opposite kidney is becoming granular, for this often happens, but on the other hand it is often simply hypertrophied. Cancer-cells are very rarely found in the urine. Usually the patient does not complain much of pain. When it is present it is a dull ache, and not like the pain of renal colic. The tumor is usually not particularly tender. Pressure on the vena cava may lead to œdema of the legs. Occasionally the patient lives a very long time, it may be years; perhaps this is because there is another kidney to carry on the renal functions, and this, too, may perhaps explain the fact that, although wasting, loss of appetite, nausea, vomiting, constipation, and anæmia are all commonly met with, they are often not so striking as in carcinoma of other organs.

In the case we have this afternoon discussed the tumor is so large that Mr. Dunn agreed with me that its removal should not be attempted.

CONCERNING THE BLUE-LINE IN THE GUMS IN LEAD-POISONING.

READ BEFORE THE COLLEGE OF PHYSICIANS, PHILADELPHIA, MARCH 3, 1897.

BY D. D. STEWART, M.D.,

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If an apology is necessary for addressing the College upon a subject about which I have little that is novel to offer, it is that a knowledge of it must be considered of perennial importance.

Some few remarks that were made relative to the diagnostic value of the blue-line in the discussion of the paper of our distinguished President, two months ago, indicated a lack of exact knowledge as to what constitutes the so-called *line* and its mode of causation. This is, perhaps, pardonable in view of the fact that attention has been given to the subject by but few systematic writers on medicine, and but a small number come sufficiently into contact with cases of recognized lead-poisoning to regard it as essential to be well-informed on the subject. And yet, in view of the further fact that lead is one of the widest-spread and the most ubiquitous of poisons, causing most protein manifestations, it behooves all to be acquainted even with the minutiae of the most common sign of systemic absorption.

Perhaps in this relation, and bearing directly on the importance of the subject, I may be permitted to refer to an extraordinary epidemic of lead-poisoning which I was the instrument of unearthing, occurring in this city and brought to the attention of the authorities in the early part of the summer of 1887. This wholesale poisoning, the duration of the existence of which it was impossible to ascertain, occurred through, as was subsequently developed at the coroner's inquest, at least eighty per cent. of the bakers and confectioners in this city at that time regularly using chrome-yellow as a color-adulterant. It was shown that this dye had been in constant use by these bakers for many years. Lead-poisoning of severe

type had doubtless been occurring in widely diverse sections of the city for a long time, and these cases, save perhaps in rare instances, had all along escaped recognition, simply because of the possibility of it, through absence of apparent source, not being taken into account in arriving at a diagnosis in a case with somewhat obscure symptoms, the blue-line not being searched for.

What first led to the recognition of these cases of wholesale poisoning, the result in many of which was so terrible, is now a matter of history. It need not be entered into in detail here. Suffice it to state that with symptoms totally unsuggestive of lead-poisoning as commonly seen, with total absence of colic, wrist-drop, and the like, but with the occurrence of pronounced cerebral symptoms, the so-called saturnine encephalopathy in a family, several of the members of which at the time either had pertussis or were convalescent from it, it was the search for a blue-line in the gums that led to a solution of the mystery. After all sources for the convulsive seizures had been considered in vain, finally, by exclusion, I thought of lead and searched for the blue-line. It was the discovery of this, which, although not decided, was undoubted, in the second of the fatal cases that I had seen in the Diebel family, that decided the question and led to a search for the source of the poisoning. In pursuit of this it was the discovery of a most intense line in the gums of the family's baker and his wife, and the history elicited from these two of several deaths from convulsions of undiscovered source that had occurred some years before in their own family, that determined me upon a search of their cellar for chrome-yellow. This incident is merely noted in passing as bearing on the importance of a knowledge of the character and diagnostic significance of the blue-line in the gums and the necessity of a search for it in cases of obscure illness, the nature of which is in doubt. Instances might be related of lead-poisoning with ill-defined symptoms and source, the last other than the adulteration of cakes, which I have subsequently encountered and in which the presence of a blue-line has assisted most materially in throwing light on the diagnosis. Some of you have undoubtedly encountered similar cases.¹

It was from an examination of these cases of chrome-yellow poisoning, nearly one hundred of which I had collected, that I obtained the chief data for this paper, studying the line in its various

¹ These are common enough in medicine, although detailed chiefly in memoirs.

stages and over a long period. Since that time, now nearly ten years ago, I have seen a great many cases of lead-poisoning, so that I may be regarded as able to speak with some authority on the nature of this diagnostic sign in question.

Henry Burton, in his memoir on "A Remarkable Effect upon the Human Gums produced by the Absorption of Lead,"¹ is generally regarded as the first to have pointed out the occurrence of the blue-line as an indication of the systemic absorption of lead. In this communication he gives a detailed account of such phenomena as he had studied relative thereto from the time his attention was first directed to the line occurring in the case of a patient in the wards of St. Thomas's Hospital, in 1834. But Tanquerel, in all probability, before this date had noted and studied the line, his wonderfully painstaking investigation into lead-diseases, which culminated in the appearance of his classic work on this subject in 1838, having been begun in 1831. In this Tanquerel has given a quite thorough description of the gingival discoloration as occurring in its most pronounced type. The cases in which the line was remarked by Tanquerel were all in those poisoned by occupation and commonly displaying aggravated symptoms of plumbism. Under the caption "Leaden Discoloration of the Teeth and Mucous Membrane of the Mouth," Tanquerel noted with great accuracy the limitation of the bluish or slate-gray discoloration through an extent of a few lines in depth on the gingival margin, and remarked that the remainder of the gum often presents a light bluish-red color; that in extreme instances the slate-color may tint the whole extent of the gum. In these, by prolonged contact with decomposing food-elements or even viscid saliva, a more diffuse, general discoloration of the mucous membrane was inevitable. Tanquerel called attention to a similar, now commonly observed, discoloration of the exposed fangs and body of the teeth in those with unclean mouths. He referred to the peculiar nutritional changes occurring in the gum-margin under the influence of the prolonged action of lead; its shrinkage, with subsequent disappearance of the affected interdental processes of the gum, and atrophy and denudation of the portions surrounding the fang. He remarked on the deposits of lead being commonly more decided in the gum of the lower than of the upper jaw, and that it sometimes occurs that only the margin of two or

¹ Medico-Chirurgical Transactions, 1840, vol. xxiii.

three teeth become blue and are subsequently absorbed. In a few cases observed he noted also that the dyed gum-margin was so congested that bleeding occurred on slight irritation.

Tanquerel ascertained that the discoloration of the gums and of the teeth was chemically lead sulphide. He pointed out that the sulphur, as is now accepted, is probably derived from the decomposition of albuminous food-particles and not from the sulpho-cyanogen of the saliva. H_2S formed from these, he thought, came into contact with lead-particles in the mouth, and, depositing on the gum, originated the discoloration. He therefore thought the blue-line, as it is usually seen, a local sign; but since he also speaks of congestion and subsequent atrophy of the gum, with dental caries, resulting from obstruction of the capillary vessels of the gum by the lead sulphide, he, doubtless, although he does not specifically so state, also regarded the lead-line as at least occasionally also intragingival.

Tanquerel remarked, in concluding, that this lead discoloration of the gums affords an excellent means of discovering whether an individual has inhaled or swallowed lead-particles.

As previously stated, Burton is commonly credited with first noting and describing the pigmentation of the gums occurring as the result of the deposit therein of lead sulphide. Although, as I have said, this is unlikely, he at all events may be claimed to have remarked this sign at least coincidentally with Tanquerel, and while unaware of the latter's investigations. Burton's observations on the blue-line were largely confined to cases, usually of phthisis, in which the line was the result of lead absorption from its medicinal administration. At that time lead acetate was freely employed internally as an astringent, especially in hæmoptysis, and it was evidently not uncommon to obtain by its use some indication of slight poisoning other than the blue-line, the occurrence of the last of which, as remarked by Burton, was merely a sign of the systemic presence of the metal; as such Burton regarded it of the greatest diagnostic value. His experience warranted him in viewing it as a very common occurrence in those who, by accident or design, had absorbed lead. He remarked that this sign preceded all other unequivocal symptoms,—a sign even more distinct in death than in life.¹ If

¹ This observation of Burton's, that this lead discoloration of the gum is commonly more pronounced after death, I have verified in several fatal cases observed by me. The distinctly blue gingival margin was in far sharper contrast with the pallid gum than had been evident in life.

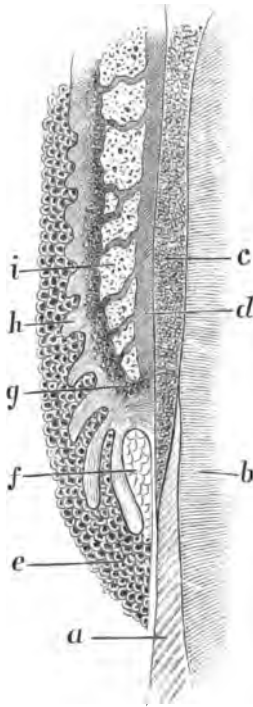


FIG. 1.—THE GINGIVAL BORDER.—*a*, enamel; *b*, dentine; *c*, cementum; *d*, peridental membrane; *e*, epithelial covering of the gingival border; *f*, gingival organ; *g*, granular deposit and globular cells at junction of the peridental membrane and its processes, *h*, between the papillae and the alveolus, *i*.

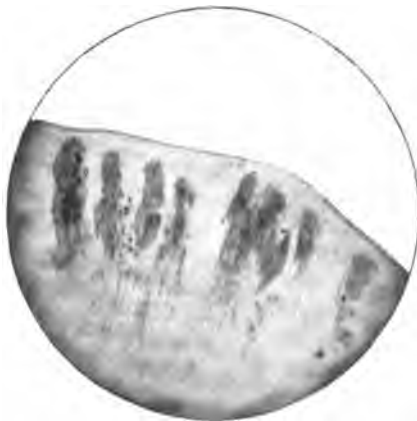


FIG. 2.—Section of gum in chronic lead-poisoning. Photomicrograph $\times 120$.

Burton may not be credited as the first to note the blue-line and its significance, he, far more than Tanquerel, deserves praise for specifically pointing out its immense diagnostic importance, standing, as it does, as the indication of the systemic absorption of lead. Burton urged the necessity for a search for the line in doubtful cases, remarking that its appearance, even though exposure to the metal had given rise to no symptoms, should be taken as a friendly warning of the probable approach of serious effects of lead on the nervous system.

Besides the observations of Tanquerel and Burton on the subject, the only other recorded especially worthy of note is that by Hilton Fagge. In a contribution to the Medico-Chirurgical Society¹ and in his posthumous work, which contained data of the highest value relative to certain peculiarities of the so-styled line, he especially pointed out that the term *blue-line* is in many instances a misnomer. He called attention to the fact that the line which is really characteristic at first is not continuous, but consists of merely a single row of *black* dots or a series of the same corresponding with vascular papillæ in the normal mucous membrane. This observation was originally made by Sir William Gull, to whom Fagge credits his indebtedness. Gull had remarked that the same papillæ, which correspond to minute vessels arranged side by side, may often be noted as fine, reddish points in the gums of healthy subjects. By removing with fine scissors, as I have since repeatedly done, the edge of the gums in which this lead-pigmentation was evident, and examining under a low power, he demonstrated that the discoloration was not uniform, but was distributed in the form of rounded loops, some of which have the appearance of papillary processes of the mucous membrane, but many of which are actual small vessels the walls of which are marked out by the lead deposited in their lumen. Fagge remarks that Gull had observed that the line, in its earlier development, is usually imperfect, there being only two or three dots here and there, and these, perhaps, only noticeable in the processes of gum which project between certain of the teeth. He noticed how, with exaggeration of the discoloration, the dots cease to be apparent, and a deep, homogeneous staining of the mucous membrane, several lines in depth, takes their place. He stated that the blue color of the line is only apparent, as examination

¹ Medico-Chirurgical Transactions, 1876, vol. lix.

with the lens will reveal. These dots will then in reality be seen to be black. These observations of Gull and Fagge, which I have abundantly verified, indicate beyond question that this form of blue-line at least cannot be viewed other than as a demonstration of deposit of the metal from within. Fagge also pointed out that in several cases he had noted that the employment of potassium iodide in subjects of lead-poisoning caused a not inconsiderable increase in a faint line already existing, and brought about the development of one not before apparent. The exact explanation of this interesting phenomenon, also remarked simultaneously by Dr. Smith, of Sheffield, and later by myself (as concerns intensification of the pigmentation under the use of potassium iodide), I regard as follows: While lead-salts are but poorly soluble, and as chlorides or bicarbonates can be contained only to a limited extent in the blood, the double iodide of lead and potassium is much more readily so. As a result, under the influence of potassium iodide lead deposit in the tissues is promptly taken up and its solubility maintained; hence a much greater quantity may appear in the blood, and, passing through the vessels of the gums, be easily precipitated in the latter. Doubtless the tendency shown by the gingival margin towards eliminating iodine is also a considerable factor in the production of increased pigmentation under the influence of potassium iodide.

Nearly all the French observers writing on lead-pigmentation of the gum, such as Fleury, Grisolle, Valleix, Constantine Paul, and A. Grubler,¹ have curiously held to its being but an occupation-sign—i.e., of the entrance of lead into the gum directly from the mouth. These authorities had come in contact only with very pronounced cases of plumbism in subjects in whom the presence of lead in the mouth from their work was common. It seemed easy for these observers to believe that lead could be readily deposited in the gums because of its more or less constant presence in the mouth. They

¹ Grubler (article on the "Semiology of the Mouth," *Dechambre's Dictionnaire Encyclopedique des Sciences Médicales*), who has had no practical experience with lead cases, attempts to explain the origin of the line from without by remarking that perhaps its occurrence is analogous to a phenomenon which has been observed in natural history, the taking up of a spicule of grass by a rapidly growing mushroom, the fungus tissue of which divides to enfold it. Although this may explain the chance entrance of lead into the epithelial cells of the gums through prolonged contact, it cannot, of course, explain its primary precipitation in the vessels of the gum in the earlier period of pigmentation before the lead sulphide has been extruded from their walls into the adjacent intervascular tissue.

were either unaware or took no note of cases in which a blue-line was common from the use of drinking water containing such infinitesimal traces of lead that for it to be deposited on the gum in process of drinking is out of the question.

Oliver, who has furnished us a most instructive work on lead-poisoning,¹ but whose immediate observations or lead cases have been confined almost solely to those of pronounced type among lead-workers, is also inclined to favor the view that the blue-line is due to the deposit of lead from without. He has never noticed the very delicate and highly important slight pigmentation described by Fagge, of which I have seen more than a score of instances, and remarks on only the deeper line, such as is encountered in lead-workers.

Oliver believes that there is absorption of lead from the mucous surface either by the lymphatics or the cells themselves, and yet, curiously, he speaks of a case in which a blue-line developed a day after a single large dose of lead acetate had been taken, and he probably is aware of the cases cited by Burton, in which, after the ingestion of but fifteen grains of this salt, the blue-line developed four days later; and of another case (Peasey's), in which it developed in seven days after twenty-one grains; and of Moyle's case, in which the discoloration was produced in twenty-four hours by four doses of five grains each. It is presumed that lead so administered, given for medicinal purposes, was not allowed to remain long in the mouth.

Dr. Oliver, in citing his views as to the mode of origin of the blue-line, evidently neglected to note the significance of a case narrated on another page of his book,—that of a gentleman with pronounced symptoms of plumbism, such as cachexia, colic, and, later, paralysis and cerebral manifestations, in whom there was at first a slight blue-line, which subsequently, coincident with the appearance of aggravated symptoms, gradually deepened. His wife had also a blue-line. The source of lead was the drinking-water, which contained the metal only to the extent of 0.0028 of a grain to the gallon. It is common for those who have had much to do with lead-poisoning to have observed the presence of a blue-line in cases due to the presence of quite as minute traces of lead as this in drinking-water. I have seen a number of instances of such, and Putnam, of

¹ "Lead-Poisoning, in its Acute and Chronic Forms." The Gulstonian Lectures, 1891. Young J. Pentland, 1891.

Boston, among others, has encountered a large number. These facts, with others cited, seem to establish unquestionably that lead in the gums is a deposit from the blood.

For the correct understanding of the presence of the blue-line in the gums, a few words must be said concerning the gross and intimate anatomy of the peridental membrane (Fig. 1, *d*). This structure, which is the organ of touch of the tooth, surrounds its root, uniting it with its alveolus. Concerning this membrane, Mr. Salter¹ remarks that "it consists of an elastic layer of fibrous tissue, intimately connected and continuous with the periosteum of the jaw; upon this is placed a regularly and strongly marked papillary structure, covered in by a dense epithelium. The papillæ are long and cylindrical near the edge of the gum, like the fingers of a glove, and they become shorter and expand in passing towards the jaw and palate; each papilla contains a single capillary loop."

The peridental membrane is on all sides intimately connected with the tooth and periosteum of the walls of the alveolus by bundles of fibrous tissues, styled the dental ligament. Normally this attachment to the tooth extends to from one-eighth to three-eighths of an inch from the extreme edge of the margin of the gum, varying, as Black remarks,² in different persons and in the same teeth and in the same person. This unattached margin of the gum is termed the gingival margin, and by some the gingival organ. It seems to possess a gland-like structure, though of the simplest kind. It consists of a surface which, clothed with small, round epithelial cells, is cupped and folded between ramifications of a rich capillary net-work. This emits a profusion of globular cells, termed mucous corpuscles. These mucous corpuscles, often as inspissated masses, and not infrequently mingled with colonies of micro-organisms and particles of food, are always found in this situation, beneath the free, thin edge of the gum. It is this portion of the gum that is concerned in the excretion from the blood of certain poisons, such as mercury, iodine,³ copper, and, in all probability, lead. These, and especially mercury and potassium iodide, tend in process of excretion to readily produce

¹ Dental Pathology and Surgery.

² This description is largely from that given by G. V. Black in *American System of Dentistry*, vol. i.

³ Cells taken from the gingival border in cases in which potassium iodide is being administered have been found by Salter to give the iodine reaction.

irritation and subsequent inflammation of this free margin of the gum.

However lead enters the system, after absorption it must exist as a soluble salt in the blood, which latter, in all probability, when the mode of entrance is through the stomach, is lead chloride. As lead chloride, and perhaps also as other soluble salts, the nature of which is undetermined, it circulates in the blood, but in very small quantity however freely it may have been ingested, since even the most soluble salt that can gain entrance into the vascular system tends readily to be precipitated in the tissues after its osmosis from the vessels with the plasma. Solubility of the lead-salts in the blood seems to be maintained through the influence of the contained chlorides. At the best, such salts can exist only in the smallest quantity, and the removal of but a small part of their solvent must lead to their prompt precipitation in whatever part of the economy they may be.

The poorly soluble and easily decomposable salts of lead, in process of circulation through the capillaries of the gums, are easily acted upon by even minute traces of liberated sulphur from decomposing food detritus, which may exist but in the smallest amount in order to furnish the necessary element for separation of the lead-salts and its precipitation as lead sulphide. It has been seen that normally for the extent of from one-eighth to three-eighths inches the gum about the neck of the teeth is unattached, and that the inner portion of this edge may be regarded somewhat in the nature of an excretory organ. It is easy to understand that with a slight excess of mucous corpuscles in this situation, as a result of the irritant action of small quantities of lead which must be in process of excretion here, there is a tendency to separation of the gingivæ, if such separation does not already exist. Even in those who pay the closest attention to mouth-hygiene, this favors the accumulation of food-particles about the neck of the teeth. Concerning the question of mouth cleansing in a manner that obviates tooth-decay, it must be said that as practised by even the great number of those who regard themselves as most fastidious in this particular it is commonly but poorly done. The mere use of the tooth-brush twice daily, if unaccompanied by thorough rinsing of the buccal cavity after food, and, when there is a tendency of food-particles to lodge in the interstices of the teeth, also the employment of the silk

thread, inevitably leaves a certain amount of detritus about the neck of the teeth adjacent to the dental margin. Concerning the truth of this there is no doubt. It is the decomposition of these food-particles, however infinitesimal in amount they may be, which occurs readily about the canines, bicuspid, and molars, especially in the lower jaw, that yields the traces of hydrogen sulphide necessary to readily precipitate the lead circulating in the capillaries in the edge of the gum. In this manner pigmentation of the gingival margin adjacent to one or several teeth occurs. The pigmentations will necessarily be slight in those of cleanly habits, and perhaps only be discoverable as a few scattered black dots in the thin margin of gum about one or two teeth. But even in these, should systemic saturation be pronounced, continued precipitation in the gum will occur, and afterwards a well-marked line will appear. In those habitually inattentive to the mouth, though no more lead has been absorbed than in another case, the pigmentation will be far more decided from the first. It is the failure to recognize these slighter but most significant (from a diagnostic stand-point) degrees of pigmentation, in a search for an actual broad line, that has frequently led many otherwise acute observers to overlook the undoubted presence of what technically may be termed *a line*. I regard the failure to note this slight pigmentation as very frequent, even among those who have had some experience in lead-poisoning occurring in lead workers; and thus, I am sure, cases are not infrequently cited in which it is stated a blue-line was totally absent in the face of pronounced lead-poisoning. I have so frequently encountered cases in which these small pigmentations, due to the deposit of lead sulphide in the edge of the gum, were not remarked by others who had made, at my suggestion, a search for a line, that I have for a long time placed little value on the negative observations of those whose attention has not been especially directed to this phase of the subject.

In the very large number of chrome-yellow poisoning cases, most of which I had under observation for several years, and in a considerable number of hospital cases subsequently seen, I have had abundant opportunities to study the line. What made certain of these cases of special interest was the fact that many of them were of cleanly habit, and had, when they came under observation, well-preserved teeth and gums.

All of the chrome-yellow cases I personally observed displayed a blue-line. In at least seventeen of these it was noted that the line consisted of but a very narrow bluish-black streak or a series of dots limited to the thin edge of the mucous membrane of the gum grasping the neck of but one or two teeth. These dots, or the black streaks which represented but an aggregation of them, were most frequently confined to a portion of gum grasping but a single tooth, often one of the bicuspid or anterior molars. Several of these cases, including two of the Diebel family, exhibited, besides cachexia, only the cerebral manifestations of lead-poisoning; colic and other more common symptoms being totally absent; so that, if not on the watch for this phase of the line, the diagnosis might have been in doubt had not the history of the ingestion of lead, the discovery of this metal in the urine, with cessation of symptoms on appropriate treatment, established the diagnosis.

The history of one of these cases, previously published,¹ may be cited here to show the importance of the search for this phase of the line:

Mrs. V. G., aged twenty-two years, no children; had been for months a hearty eater of Palmer's dyed buns; in excellent health up to three and a half months before she came under observation; she then began to grow progressively weak; was easily wearied, the slightest exertion causing great fatigue; she suffered with insomnia, was depressed mentally, and there were constantly present such disorders of the digestive apparatus as coated tongue, foul breath, bad taste, frequent nausea, with occasional vomiting, especially after food, mild constipation, and occasional slight, colicky pains. There were also total anorexia, an earthy-yellow hue of skin, and severe, constant, dull, aching pains in the knees, with a feeling of soreness in the feet. Violent occipital and frontal headache appeared shortly after she began to fail in health, and soon became constant, with remissions and agonized exacerbations often associated with transient amblyopia. About the same time she was affected with subjective and objective vertigo, the slightest exertion causing giddiness. With the appearance of headache and vertigo there occurred frequent hallucinations and delusions of sight and hearing. During and following these spells she becomes exceedingly despon-

¹ A Clinical Analysis of Sixty-four Cases of Poisoning by Chrome-Yellow, used as a Cake-Dye, by D. D. Stewart, M.D., Medical News, December 31, 1887.

dent and has dismal forebodings. . . . There was slight ataxia of the forearms, but with normal response to faradism and galvanism. The heart was overacting, with an accentuated second sound at the apex and high tension in the pulse at the wrist. The urine was albumen free, but contained lead. An eye-ground examination was made by Dr. Hansell, who reported that "in the right eye the nerve is oval; the upper and outer quadrant is lined with pigment; the lower part is clear and sharply bounded. There is venous pulsation; the arteries are slightly swollen, more so than normal. The above conditions are even more pronounced in the left eye." The gums of this case did not show what is ordinarily regarded as a "blue-line," but within the thin margin of gum grasping the neck of the upper left central incisor could be seen, by careful inspection with the naked eye and more easily with a single lens of moderate power, a number of bluish-black dots, which were undoubtedly lead. A piece of white paper pushed up under the edge of the gum, between it and the neck of the tooth, brought out the dots with great distinctness. The thin edge of gum about the necks of the lower central incisors showed this pigmentation somewhat more plainly.

In still another case not previously reported, in which pronounced symptoms of deterioration in health had occurred, with the appearance of some cachexia, yet with no marked line apparent, there was the same narrow, dotted streak opposite the thin margin of gum grasping the second bicuspid and the adjacent anterior molar on the left side. This case was especially interesting, in that, although the patient lived in the house adjacent to baker Palmer, he had not eaten of the poisoned cakes. It was the discovery of lead-poisoning in this patient that caused me to have a sample of exceedingly yellow noodles sold by the grocers in the neighborhood, of which the patient was in the habit of eating, analyzed. The source of his ill health was here found. The noodles were ascertained by Dr. Leffmann to be quite heavily charged with chrome-yellow.¹

In these slighter lines the lead is chiefly gathered in the lumen of the smaller vessels, which it maps out by its presence. The

¹ It may be of interest to state that the maker of these noodles was subsequently convicted and imprisoned, with the two cake-bakers, for food adulteration.

specimen here shown is of this sort. The minute vessels are beautifully indicated by the precipitated lead sulphide (Fig. 2).

In clippings from the affected gum in more pronounced attempts at a "*line*," yet with no contraction or atrophy of the gum, I have frequently noted that the lead not only occupies the interior of the vessels, but is deposited in their walls and about the intervascular spaces, tending to fill in on all sides the terminal edge of the gingival margin. In such instances as these the mucous membrane shows a disposition to separate from the neck of the tooth, and, because of constriction of its vascular supply, tends later to atrophy. Subsequently, as the lead is freely deposited in the gum, retraction succeeded by absorption of the gingivæ occurs. A deep blue-line now marks this portion of the affected gum. Subsequently, with continued deposition of lead, the nutrition of the gum is so far interfered with that absorption of the dyed portion about the root of the tooth speedily occurs. The lead sulphide completely occupies all the smaller vessels and the tissues adjacent. The gum is hemorrhagic, bleeding freely on the application of slight friction. Later, with considerable retraction of the gum and exposure of the fang, the former, from atrophy of its margin proceeding irregularly, becomes fringed or peaked. In several families, each composed of a number of members (eight to ten), all of whom suffered, although in varying degree, from eating the dyed buns, all these changes in the gum could be noted at the same time in their various phases. The dotted condition of the thin edge of the gum in one member, the bluish-black slight streak in another; in a third, more severely poisoned, there was apparent a deeper, more pronounced, blue-line, with separation and partial atrophy and retraction of the gingival margin, with exposure of part of the fang of the tooth. In still another member of the same family the fringed condition, with great intensity and broadness of line, was evident. In all of the cases observed in which a well-marked blue-line was noted in the gum (of the labial surface), a similar, though less well-marked, discoloration was also noted in the lingual (inner) gum margin about the necks of the teeth.

It has been stated by writers on the blue-line that in the portion of gum in which no teeth exists no blue-line occurs. I have encountered several interesting exceptions to this. In one of these, in which the teeth were nearly all gone, a line extended along a good

part of the upper and lower jaw. In this, as in the other cases that I saw with a similar line and absence of teeth, the fangs in many of the sockets yet remained covered by gum. The presence of these had prevented the atrophy of the gum and permitted the development of the blue-line by offering a site for the reception and decomposition of food-particles.

In many of the chrome-yellow cases that were inattentive to the condition of the mouth and ate largely of the cakes the line was often of great depth and intensity, and many of the teeth exhibited a black discoloration; the last and perhaps a portion of the former was due to a direct deposit of lead sulphide from the mouth, through particles of food containing the lead-salt,¹ remaining long in contact with the teeth. In the case of the baker's wife, before mentioned, the labial surface of the whole gum in the upper and lower jaw was deeply dyed, besides there being a deep blue-line in the gum of the lower and upper jaw at the junction with the teeth. The teeth were also heavily discolored with lead sulphide.

In cases such as these there could readily occur a similar deposit of lead sulphide on the neck of the tooth adjacent to the gum and beneath the gum itself through the lodgement of food-particles charged with the metal. This would, of course, constitute a local line and be in no way related to that produced by lead precipitated from the blood. In this connection it is important to speak of a pseudo-blue-line which has no relation to lead-poisoning. In certain cases with somewhat uncleanly mouths, yet with the gingival margin well preserved and in approximation with the neck of the tooth, there may appear a narrow blue or bluish-black streak in the gum that is very suggestive of the blue-line of lead-poisoning. I frequently meet instances of this. This pseudo "blue-line" may be due to either a black discoloration of the portion of the neck of the tooth beneath the gum-margin or to a similar staining of the secretion from the gingival organ, which tends, sometimes, to unduly collect here. To avoid error, it is important in all cases in which suspicion of a blue-line exists to carefully ascertain if it is intra-gingival. This can readily be done, and should be determined in

¹ The chrome-yellow used by the two bakers as a cake-dye was found to consist of lead chromate, fourteen to thirty-two per cent.; lead carbonate and oxide, forty-seven to sixty per cent.; lead sulphate, eighteen to twenty per cent. See as to this, a paper by William Glenn, in *SCIENCE*, May 3, 1889, p. 348.

each instance, by running a small-sized piece of paper beneath the suspected unattached gum-margin, thus separating it both from the loose *débris* beneath and from the neck of the tooth also. Should the pigmentation not be intragingival, it will then no longer be apparent, while, if it be due to the deposit of lead in the gum, it will be far more evident.

A word as to persistence of the blue-line after the employment of eliminants of the metal and the removal of the source of poisoning.

Potassium iodide, about the utility of which as an aid to the removal of the metal from the tissues there is no doubt, can have little or no eliminant action on the lead already deposited in the gum. That it will, indeed, for a time be apt to contribute to the latter until lead ceases to be present as a soluble salt in the blood seems more than probable from what has been already stated; but after all the lead has been removed from the tissues, should potassium iodide then be continued, this salt, in process of excretion through the gingival margin, would tend to dissolve the deposited lead sulphide there placed.

Forty-four of the cases of chrome-yellow poisoning were kept under observation for two years for the purpose of noting the later manifestations. Changes occurring in the gums and in the character of the line were carefully observed with other symptoms. An account of these was published a number of years ago.¹ From this account the following observations as to the condition of the gums at the expiration of a year and a half after the cases were first seen may be briefly cited:

"The appearance of the gums and teeth in twenty-four of the forty-four cases is yet indicative of plumbism. But three of the twenty-four received eliminative treatment. A decided though fading blue-line is present in ten; distinctly bluish-purple line in five, and a purple in nine. In twelve of the twenty-four there is much retraction and atrophy of the free margin of the gum, permitting considerable exposure of the neck- and fang-surfaces of the teeth, which, together with the crown surfaces in the greater number of the twenty-four, are yet discolored by lead sulphide. The

¹ Subsequent Clinical History of the Cases of Chrome-Yellow Poisoning, including a Case of Paralysis Agitans and one of Endocarditis, of Lead Origin, by D. D. Stewart, M.D., Medical News, January 26, 1889.

free margin of the gums in many of the twenty-four are hemorrhagic. In these slight friction causes venous oozing. The purple-line is present in the situation previously occupied by the blue."

If the poisoning has been slight and the absorption of lead ceases, the pigmentation slowly fades without destruction of the affected edge of the gum, and no retraction of the gingival margin occurs. In several cases three months after the lead ceased to be ingested the narrow black streak or the fine dotting in the thin edge of the gum was distinctly visible, and at the end of a year the same thin edge was of purple color. The black deposit of lead sulphide persists for months after exposure to the poisoning has ceased, and then gradually fades, giving place to a yellowish-brown stain.

At a variable period following the cessation of the systemic absorption of lead, the extent depending largely upon the severity of the poisoning and whether efforts have been made to eliminate the metal, a bluish-purple discoloration succeeds the bluish in the affected portion of the gum, and it, in its turn, is succeeded by a purplish, and this by a red-line entirely without any element of blueness.

LEUKÆMIA.

CLINICAL LECTURE DELIVERED BEFORE THE CLASS OF MARION-SIMS COLLEGE OF
MEDICINE AT THE CITY HOSPITAL, ST. LOUIS.

BY I. N. LOVE, M.D.,

Professor of Clinical Medicine and Diseases of Children in the Marion-Sims College
of Medicine, and Professor of the Theory and Practice of Medicine in
the Woman's Medical College, St. Louis.

GENTLEMEN,—I present to you a patient which, if his color would permit, we would observe to be very pale. If a patient presents himself to us who is extremely pale, our first thought is that it is anæmia; that is, thin blood, which may be due to several causes, sometimes to a previous hemorrhage lessening the amount of blood. Nature then absorbs the watery elements of the tissues to keep up the equilibrium of pressure in the circulation, and we have a blood short of solid constituents. Or possibly we may have a history of malaria, or of some infectious disease, both of which, as you know, are destructive to the continuity—to the life—of the red blood-corpuscles. If this condition of things were to present itself upon the part of a young girl who has just passed or is passing her first climacteric, you would have confronting your mind thoughts with reference to chlorosis. All these subjects naturally come before you for consideration when a seriously pale person consults you. The family history, the previous history, and the present condition will all help you in making your diagnosis. The one thing essential, however, in the making of your diagnosis is to determine whether you have a case of true anæmia or a mere lessening of the number of red blood-corpuscles. The presence of that much more serious disease known as leukæmia would depend upon a microscopical examination of the blood.

We have here, then, a patient who presents the characteristic features, even though he is black, of paleness. He presents weakness; he presents, as he comes into the amphitheatre, a shortness of

breath and dyspnœa, which is an evidence of weakness. His pulse is weak and frequent. You notice some disturbance about the opening to the nostrils, suggesting probable irritation by applications. (Inquiry develops the fact that he had to have his nose plugged, and that shows that he has had epistaxis, or nose-bleed.) Epistaxis often accompanies this condition, because the vessels cannot hold the blood, owing to its thinness.

Before we proceed to a further examination of this case we elicit from the record that his family history is absolutely negative. In people of his race [Negro], as a rule, the family history is negative; they cannot trace their genealogy very well. Proceeding to his previous history, we find that on March 2, 1894, he was in the City Hospital for keratitis, an inflammation of the cornea. The glands on the left side of the neck at that time were enlarged. There was no lesion or disease of any of the viscera. He was discharged April 30, 1894, improved, being in the hospital about two months. In September, 1894, he returned to the City Hospital for meteorism, due to enteritis; that is, he had gas in his guts—flatulency—due to an inflammatory disturbance there, which resulted in a general intestinal indigestion and a fermentative disturbance. Nothing else abnormal found. Discharged September 12, improved; meteorism still present. Fifteen years ago he had pneumonia. Seven years ago he had a sore on his penis. Now, gentlemen, we are getting to important history, for in all organic diseases affecting either vital organs or the blood keep in mind the specific history of syphilis. One year after, sores broke out over his body, and shortly after (more than likely the first manifestations were not noticed, as it would not usually be a year between the primary sore on the penis and eruptions; however, we are not yet certain that we have a history of syphilis) his bones, especially his tibias, became painful. There the history is developing. With this he had headache and an occasional fever,—the headache and pains in the bones worse at night. This is one of the characteristic features of so-called syphilitic rheumatism, the pains in the bones, the periosteal disturbance, the syphilitic cephalalgia, which is periosteal also; the suffering is always worse at night. Not very long ago, when, he does not remember, he had a bubo in each groin, both suppurating in a short time. At times he has had tinnitus aurium,—that is, ringing of the ears. That is a very frequent accompaniment of anæmia or any weakened condition of

the blood. As long as he can remember he has had priapism, which is worse at times, and to which he has become quite accustomed. In this connection we will state that in certain pale-blooded men priapism is a prominent symptom. That particular feature when present in a pale-blooded person points towards leukæmia. You see here the scars of the suppurated buboes upon either side in the groin. You see here upon the penis, well back, an inch at least from the beginning of the prepuce, upon the outer part of the skin, the scar of the primary sore. From boyhood he has had a strong desire to eat clay. I do not know that this has any particular bearing upon the case, except that it might interfere with the processes of nutrition, and that indirectly might affect the blood. Nearly all clay-eaters are poorly nourished. He has asked several times for clay since he has been in the hospital. No malarial history is presented, and, gentlemen, that is important, because, whatever the cause may be of this demoralized condition of the blood expressed in this excessive paleness, malaria is often an exciting cause. No hæmaturia. Stools regular most of the time. Has never passed any blood. Now, those points are important, because, mind you, the tendency to hemorrhage in a condition of the blood so demoralized as this is great; not only nose bleeding, but bleeding from any mucous surface. His gums, he says, will bleed at almost any time. You note the pale condition of the gums: instead of that rich, warm, red color which you will invariably note in comparison with the whiteness of the teeth of the black man, here you have a pale-gray color. So, too, we frequently have in this condition hæmatemesis, or hemorrhage from the stomach, and this is oftentimes a cause of fatality; also hæmaturia, or bleeding through the kidneys. The present trouble for which he entered the hospital began about two years ago, when he noticed a small knot-like swelling in the left hypochondriac region, which had made its appearance about that time. The swelling increased in size very gradually, gave him hardly any pain, and he paid little attention to it. When he did have pain it was dull in character and of short duration. At times he would have slight nose-bleed, lasting from two to three weeks at a time. Then, again, nose-bleed would be of short duration, but more severe. How often he had nose-bleed he does not know. For the past year he has noticed a shortness of breath, suggestive of weakness, which would naturally be present as the result of loss of blood, if for no other reason. During the past

year he has had loss of appetite, occasional vomiting after eating, and a gradual loss of weight, with a more rapid increase of the tumor on the left side. You note a general emaciation and enlargement of the cervical glands. This enlargement of the glands might be due to the syphilitic history which we have elicited. There is no pain on the tibia now. The ankles are swollen, due to thinness of blood. There is marked enlargement of the abdomen, a little more to the left than the right, and that would suggest an enlargement of the spleen. With the history we have we would certainly look for an enlargement of the spleen; indeed, where you have pale blood look to the spleen. There is more distention upon the left of the median line than upon the right. Palpation reveals enormous enlargement of the spleen. We will now percuss. You will note that there is dulness on the left side within two or three inches of the axilla, forward up to and including, of course, the pre-cordial dull space, across the epigastrium downward and to the right until you reach the space below the liver, and then downward diagonally across to the left, including the umbilicus, and still further to the left almost to Poupart's ligament, corroborating the evidences of palpation and indicating an enormous enlargement of the spleen. The surface of the spleen is not nodulated; it seems uniform. There is no fluctuation; it is evidently solid. On the right side of the abdomen we find a very evident enlargement of the liver, the increase of hepatic dulness not being so extensive, however, as the enlargement of the spleen, which is very much larger than the liver.

Now, we have elicited clearly and distinctly a history of syphilis. We have excluded a history of malaria. This would suggest a possible syphilitic disease affecting vital parts, including the spleen. The next step would be the examination of the blood, to determine the relative proportion of red and white blood-corpuscles. In anæmia there is a diminution of red blood-corpuscles, but no change in the relative proportion of the red and the white corpuscles. In the disease we have reason to suspect here,—leukæmia,—from the history and from the general symptoms and conditions as presented, we have a very great increase relatively of the white corpuscles, so great an increase as to change the proportion enormously. In the normal blood the proportion is 1 to 500 or 1000. In the blood here (referring to slide in microscope) you will note the red blood-corpuscles have a slightly yellowish tinge; the white corpuscles have a trans-

parent, colorless appearance, with pronounced granular centres. The examination of this blood demonstrated when he was admitted that enormous change, by which the proportions were about equal,—in the relative number of white and of red blood-corpuscles. In addition to the enormously enlarged spleen, on examination we find the heart normal, as also the lungs, but few sibilant and sonorous râles being heard on both sides of the chest posteriorly. An analysis of the urine demonstrates it to be slightly acid, with a specific gravity of 1020. No sugar and no albumen. On standing, a very heavy precipitate falls. Uric acid increased. No casts. The examination of the blood by the microscope reveals an equal number of white and of red blood-corpuscles. This of itself would be absolutely diagnostic. He was admitted, you will remember, on the 26th of January. A week later, after treatment, an examination of the blood revealed a slight increase relatively of the red blood-corpuscles and a diminution of the white blood-corpuscles.

Now, what is the etiology and pathology of leukæmia? It has been demonstrated that syphilis is an occasional etiological factor, and so is malaria, as both disturb the interior circulation, and the specific poison disturbs the very bone and sinew, if you will allow the expression, of the blood, the structure of the blood, creating engorgements and disturbance of the circulation and necessarily causing serious organic diseases. Syphilis, which we know attacks every part and parcel, every tissue, of the body, is often an exciting cause, and it would not be surprising if in the tertiary form—visceral syphilis, as it were, and we have the expression tertiary form where the bones are involved—a case of leukæmia should result from it, and I should be disposed to say that syphilis is the exciting cause of the demoralizing disease affecting the blood of this patient. We find the spleen almost uniformly involved,—enlarged,—and if a post-mortem investigation were to be made, there would probably be found scattered through it at various points an accumulation of white blood-corpuscles almost in the nature of tumors, which if cut in two would look like jelly. We would probably find the heart and the larger vessels crowded with enormous clots, which if cut would present almost the appearance of greenish-yellow pus, owing to the fact that they are almost exclusively composed of white blood-corpuscles instead of the red clot that is normal. We often find the liver involved, and in the same manner we find the

glandular tissues involved, with irregular accumulations of these white clots. The normal white corpuscle does not go to make up this great increase in white clots. It is the myelocytes, which are found in the bone-marrow, and you will bear in mind that the bone-marrow, like the spleen, is intimately associated with the manufacture and elaboration of blood, and the bone-marrow will be found, instead of presenting that pink, healthy look, to have the appearance of pus, occasionally presenting the green color resembling the core of an abscess; sometimes it is a brownish-red color. In pernicious anæmia, Hodgkin's disease, and other similar diseases, wherein the blood is seriously involved, we find the bone-marrow and the spleen also involved; so you see that we have evidence from the pathological laboratory of the important relations existing between the bone-marrow and the spleen and the equipment for blood-making in the body.

This disease is much more apt to occur in middle life, though it does occur in early life; infants as young as eight weeks old have been known to have it, and, indeed, it sometimes appears during the pregnant state as a complication of pregnancy, but rarely. A mother has been known to have leukæmia and give birth to several children during the time. The prognosis of the disease is not favorable, and that brings us to the treatment. In the treatment, as indeed we may say in all diseases involving the continuity or life of the blood, we have no better remedy than arsenic. We give arsenic in mild, benign, or pernicious leukæmia. As yet we give it largely empirically for its alterative effects in leukæmia. I would suggest, in addition, that this patient should have had mercury, and on investigation I find that he has had mercury combined with arsenic, and already I believe we see recorded an improvement. The great point, of course, in this disease, as in all other diseases, is the early diagnosis, and, indeed, even before we make a diagnosis we should guard the patient and build him up in the direction of these serious diseases. The great difficulty with such as our friend here is that they do not consult medical advice until they have to. When you have syphilis to consider, it seems pitiful that in a disease which is so amenable to treatment—so rapidly yields to treatment, if taken promptly, no matter what organic lesion may present itself, can be managed successfully—there should be such neglect. We have only to look back a few years to the greatest tragedian that we had, John McCullough:

progressive central disturbance of the nervous system was neglected by his friends, pronounced eccentricities were overlooked, and practically he was permitted to advance by regular stages into a state of helpless imbecility, depending on specific brain-disease. It seems that the more prominent the man the less disposition friends have to interfere and save him at a time when there is a possibility of his being saved. The poison of syphilis, no matter what it attacks, if combated soon enough, is curable. If the lesion, however, is permitted to advance too far, and there be destructive organic changes, of course the specific treatment is of no avail, though it may check it and may prolong life. I will say that these serious visceral lesions of syphilis, these serious organic lesions dependent upon syphilis, are nearly always found in those that have not received treatment early and persistently, until all evidence of the disease is past. Whether we have syphilis among those who are unable or too careless to give attention to interruptions in their health, even though serious, or whether among the well-to-do in the world who have been so fortunate as to have so mild a case of syphilis as to unfortunately permit them to neglect it; in other words, whether the case of syphilis be mild or severe, if it is neglected and does not receive prompt constitutional treatment, at a later period in life the victim may have all these serious organic diseases resulting therefrom.

Recently I have been giving to my patients suffering from anæmia liberal quantities of bone-marrow, numerous favorable results having been recorded. This treatment is in line with the modern animal extract therapy, and is similar in its results to the use of the thyroid gland in myxedema and other conditions. So far the results have been very encouraging, and I would recommend in this case of leukæmia, in addition to the treatment already given, that he be fed freely on bone-marrow. It may be given in the form of a sandwich, or a glycerin extract can be made of it, and administered in this way it is not unpleasant.

A CASE OF ACUTE PRIMARY APPENDICITIS.

CLINICAL LECTURE DELIVERED AT THE WESTERN PENNSYLVANIA HOSPITAL.

BY W. SNIVELY, M.D.,

Physician to the Western Pennsylvania Hospital, and Professor of Clinical Medicine
in the Medical Department of the Western University of Pennsylvania,
Pittsburg, Pennsylvania.

GENTLEMEN,—The history of this case is briefly as follows: F. S., aged twenty-four years; a railroad brakeman; no evidence of tuberculosis or syphilis; never ill before excepting that he had typhoid fever about two years ago.

Sunday evening, February 10, his train left the city at eleven o'clock; about three hours later, or, to be precise, at two o'clock Monday morning, his train being then in the neighborhood of Connellsville, he was attacked with pains in the abdomen, accompanied by vomiting, which continued without relief until his train arrived in the city again about nine o'clock A.M.

He was conveyed to his room, and Dr. O'Brien was summoned, who, he states, gave him hypodermic injections, which relieved his pain very considerably, but not entirely, and he continued to vomit occasionally, but that he felt so far relieved that he could tell that the pain and soreness were in the right side of his belly.

Tuesday morning, he says, he had a violent chill which lasted about fifteen minutes, but which did not recur. He states that his landlady told him Wednesday morning that the doctor said that he had appendicitis and advised immediate removal to the hospital, as he might require an operation. This advice was promptly acted on, and his removal to the hospital (a distance of about four miles) was effected slowly and with care.

The medical interne, Dr. Langfitt, states that on admission at two o'clock P.M., Wednesday, he was suffering with intense pain in the abdomen, vomiting, temperature 102.5° F., pulse 112, and tongue covered with a thick white fur. He also, upon examination, made a

diagnosis of appendicitis, and ordered him morphia, one-eighth grain, with calomel, one-fourth grain, internally every two hours; also a warm poultice over right iliac fossa. His condition soon became comfortable.

I first saw him yesterday (Thursday) morning, about three days after the explosion of the initial symptoms. His condition was comfortable enough; that is, he was sufficiently narcotized to permit a thorough examination, which was the more easy and satisfactory because of the entire absence of tympanism. The abdomen was normal on palpation, with the exception of a considerable area in the right iliac fossa, which was moderately thickened, indurated, and tender to the touch, most marked at a spot which I show you about an inch below McBurney's point, which, as you know, is about one and a half or two inches from the anterior superior spine of the ilium, on a straight line drawn from that point to the umbilicus. I asked him to show me himself with his own finger the point of greatest soreness, and after feeling carefully all around it, he stopped with the tip of his finger upon the spot I show you, a little below McBurney's point. There is no tumor, sausage-shaped or otherwise, present, which might indicate fecal impaction, nothing but moderate thickening and induration gradually diminishing as we pass from the point of maximum tenderness in every direction.

We make a diagnosis of acute primary appendicitis. I use the word *primary* to distinguish it from recurrent appendicitis, because we have no history of an anterior attack. We make this diagnosis because, as Osler says, "Laparotomy has taught us that, almost without exception, sudden pain in the right iliac fossa, with fever and localized tenderness, with or without induration or tumor, means appendix disease."

The fact that we find the point of maximum tenderness and thickening an inch below McBurney's point will not surprise you when I tell you that the position of the appendix varies greatly. It has been found almost everywhere in the abdomen. In this case it was probably occupying its usual position behind the ileum, but, owing to increase in weight, it may have sunk down a little during the attack.

Let us now go back to the beginning and follow the chain of events link by link to the present moment, for the purpose of elucidating the medical problem which here presents itself and gaining

information regarding its pathology. It will require some investigation to explain the phenomena which suddenly developed at two o'clock last Monday morning. (Patient, on being interrogated, says that on Sunday his bowels moved freely three or four times, a thing quite unusual for him, but he did not notice that he was not feeling as well as usual.) This, then, is all the data we have to explain what occurred at two o'clock Monday morning, but I will try to show you that, for me at least, it is perfectly satisfactory. Remember that he gives us no history of overeating or indiscretion in diet, or traumatism from jumping on or off his train,—in fact, nothing upon which to base an hypothesis to explain the pathogeny of the case before us. Let me now briefly rehearse to you the little that we know regarding the cause of appendicitis.

Osler, in his admirable text-book, says that "foreign bodies rarely lodge in it." That sounds like a dogmatic assertion which might lead you to believe that foreign bodies seldom or never cause appendicitis. Let us analyze it a little, because I believe that foreign bodies play an important rôle in its etiology. Osler's assertion is, of course, based upon the results of autopsies. But think of the comparatively small number of cases in which an autopsy is actually made. Remember, also, the difficulty of finding exactly what we expect to find at an autopsy. Only he who has had experience can appreciate the difficulties encountered in searching through a mass of pus and infiltrated tissues matted together by adhesive inflammation, but notwithstanding these difficulties, foreign bodies have been found in a sufficiently large number of cases to lead me to believe that they play the most important rôle in the genesis of appendicitis. Of course, I concede the existence of many other causes,—fecal concretions or enteroliths, twisting from traumatism, etc. It is difficult to conceive how the affection can possibly occur in the absence of anything to produce an initial lesion. We can understand how in the presence of an abrasion the coli commune, or any other germs you please, may be afforded an opportunity for a display of pernicious activity resulting in inflammation. Clinically, the terms catarrhal and suppurative appendicitis have not much meaning for me. Why not admit that one may follow the other, that both may occur in the same case. It appears to me a simple matter. Submitting the influence of catarrhal inflammation, the mucosa of the appendix swells and occludes its lumen; the cavity becomes filled with imprisoned mucus; this

becomes infected; the mucus is transformed into pus resulting in the conversion of the appendix into a pus sac; the suppurative inflammation may perforate, or it may be readily propagated through the infiltrated tissues of the appendix to its serous investment producing a local peritonitis by contiguity, which may or may not become general. It has been stated that the first symptoms of appendicitis are due to the peritonitis, and this is probably true in many cases.

In the case before us the first symptoms were abdominal pains, vomiting, and purging, followed thirty hours later by a single well-pronounced chill. Is it not likely that pain, vomiting, and purging preceded the development of the peritonitis; that the pain and purging were due to the stimulus of irritation resulting in tonic spasm of the muscular coat of the appendix, and possibly also other portions of the intestine; and that the vomiting was due to reflex sympathy? Is it not also probable that the chill which occurred thirty hours later marked the development of local peritonitis? However this may be, something must have been going on in his appendix prior to two o'clock last Monday morning; call it what we please, irritation, congestion, inflammation, it did its work silently but effectively. No premonition of its presence or pernicious activity, excepting a few loose stools on Sunday. Monday morning at two o'clock it had probably attained such intensity that the appendix could no longer submit in silence to the provocation; hence the pain, the purging, and the vomiting. About three days later (Thursday morning) the inflammation had probably attained, by propagation, the tightly fitting peritoneal investment, lighting up a local peritonitis which caused the temperature to rise rapidly; and you know how rapidly and continuously it must rise to produce a chill such as he describes. It was fortunate for him that at this moment the peritonitis did not become generalized; had this occurred, operative interference would probably, as usual, have been too late. But a certain amount of damage must have been inflicted. It has probably left him with his appendix compressed, incapable of expansion, its lumen perhaps occluded and filled with an interstitial exudate or pus, its walls infiltrated and thickened, and adherent by its inflamed and thickened serous investment to the surrounding structures, themselves in a more or less damaged condition. It left him feverish and sore and tender to the touch, so that he is liable by the slightest indiscretion, at any moment, to break down the frail barriers which

interpose between him and death. From what I have just said you can appreciate the danger of the situation. It is the duty of the physician to ward off, if possible, this danger.

What are the indications for treatment? To abolish pain; to arrest vomiting; to limit as absolutely as possible peristaltic movement.

Physicians are pretty well in accord regarding the measures to be employed to meet these indications. We are all agreed upon a *diet* as absolute as possible; we are a unit as to the value of *rest* as a curative agent,—rest in bed; and surely no intelligent physician would be willing to dispense with opium; some may prefer opium itself in pill or powder; others morphia placed upon the tongue; others morphia hypodermically; others morphia with minute doses of calomel internally. There is much honest difference of opinion regarding the value of calomel. I believe it is useful in cases where the vomiting persists; others attach a much greater importance to it. I do not believe that it is ever injurious in these cases unless it should purge, which it is not likely to do when combined with opium, but its valuable effect, like that of many other drugs, is difficult of explanation.

The treatment, then, can be summed up in a few words: A diet as absolute as possible; rest; opium, or calomel and opium. This may appear simple enough, but it is not so easy to carry it out with entire satisfaction to ourselves and benefit to the patient. This was a very sharp, acute appendicitis from the début until after his admission to the hospital. His temperature is now almost normal; the acute phase is about over; we can say that it is verging upon the chronic condition; with the fall of the temperature and the subsidence of the constitutional disturbances he will become hungry; to-day or to-morrow he will be clamoring for food; should his desires be gratified, he would probably be in the hands of the surgeons in a few hours. We will find it necessary to explain the danger to him; to exact obedience by threatening him with an operation; and yet in spite of all our care, his disease, which we can now say is chronic, but which we cannot say does not still possess within itself formidable elements of danger, may silently progress; the constitutional disorders may reappear; his temperature may rise again; vomiting may recur, and pain, with or without accompanying tympanism, may begin to radiate over the abdomen; at the very first appearance of such a clinical

syndrome, which would indicate the development of general peritonitis, he should be operated upon immediately, and even then it would probably be too late. So you see that, notwithstanding his present apparently favorable condition, the prognosis must necessarily be held in abeyance.

How long, for what length of time, must we insist upon our precautionary treatment? *Precautionary* is a good word in this connection. I like it much better than the word *conservative*, which our surgical colleagues seem to regard as a synonym for cowardice and ignorance.

Of the cases which terminate fatally, the vast majority are killed during the first week; we are now at about the fifth day; it will be proper to keep him on the verge of starvation a week longer, if we can, unless the induration and thickening subside sooner; we can also gradually diminish the calomel and opium which he is taking; we can also, if we find it necessary, resort to the careful employment of enemas.

How repair occurs, and to what extent in a given case, are interesting questions. In a case like the one before us, should he recover, we cannot expect repair to be complete. There is probably too much injury inflicted to permit perfect cure, and we must admit the possibility of recurrence. But you must not judge all cases of appendicitis by this one. This was an exceptionally frank, acute, violent case. The *début* is not always characterized by acute agonizing pain, by vomiting and purging, or by a prolonged violent chill. The pain may be so insignificant that the patient may regard it as of little importance; chill may be absent, or it may be replaced by chilly sensations, and slight nausea may take the place of vomiting. Such a case may be overlooked or neglected, and, progressing without precautionary treatment, or perhaps purged, may at any moment become a case for operation.

Recent extensive literature upon the subject might lead us to believe that appendicitis is a very fatal disease. I am willing to concede that it is a very dangerous, but not necessarily fatal, disease. The surgeons, fortified with the evidence of autopsies, usually in cases operated upon, have maintained that the damage inflicted is usually irreparable; but while they have been carefully compiling their statistics of mortality and dazzling the public with descriptions of their operations, which, alas! are usually too late, the physicians,

who probably see twenty cases where the surgeons see one, have been keeping discreetly quiet, watching case after case get well. I have personally interrogated a few physicians of large experience, private and in hospitals, whose reputation for veracity is good, and have been surprised to learn the large number of cases they have had under their care, some of them without a single death; and this is my own experience. If this experience be general all over the country, the evidence is overwhelming. We have not been hearing much of the large number of cases recovering without operation, while the cases operated, no matter with what result, have been pretty generally exploited in the medical journals.

Clinic, Monday, February 18, 1895.—Patient very hungry; tongue white; no emesis; no catharsis; temperature normal; area of induration and thickening not so marked, but sore and tender on palpation.

Clinic, Monday, February 25, 1895.—Patient comfortable, but hungry; temperature during past four days, 97; pulse, 46 to 60; tongue still white; bowels have moved naturally; says he feels weak, —from starvation; no soreness or tenderness on palpation. No area of thickening and induration verifiable on examination externally and by the rectum.

With the light we now possess, are we not justified in assuming that the cure is almost perfect; that repair is almost complete; that the occurrence of suppuration was in this case problematical; that the appendix has not remained occluded, but merely thickened and perhaps adherent to its peritoneal investment; and that the danger of recurrence is slight?

THE PREVENTION OF TUBERCULOSIS.

CLINICAL LECTURE DELIVERED AT THE PHILADELPHIA POLYCLINIC.

BY AUGUSTUS A. ESHNER, M.D.,

Professor of Clinical Medicine in the Philadelphia Polyclinic; Physician to the Philadelphia Hospital, etc.

GENTLEMEN,—Even at the risk of developing no new fact, I shall be bold enough to offer for your consideration a discussion of some points connected with the prevention of tuberculosis. When it is remembered that this disease causes more deaths than any other, and that many of these are avoidable, one may risk criticism for the iteration and reiteration of principles the intelligent application of which must result in the prevention of much disease, the avoidance of much distress, and the saving of many lives.

It was long suspected that tuberculosis of the lungs was dependent upon a particulate cause, but it remained for Robert Koch, in 1882, to demonstrate by a series of observations, remarkable for their precision and completeness, that the causative factor is a minute vegetable organism, the tubercle bacillus, and that the disease could not be developed in the absence of the bacillus. This truly great discovery was not received without opposition, but at the present time it is almost universally accepted; although, at the same time, it is appreciated that certain conditions are favorable to the lodgment and activity of the bacillus in the human organism, and that certain other conditions have an opposite influence. What these respective conditions are cannot as yet be defined, and they are but inadequately expressed by the use of the terms “predisposition” and “immunity” respectively.

With the demonstration that tuberculosis is dependent upon the tubercle bacillus; that tuberculous processes, wherever located, are identical; and that each case must arise from some pre-existing case, there was at once suggested the essential principle upon which a successful prophylaxis must be based,—that is, control of the spread

of the bacillus. It may be safely predicated that if the discharges from all cases of tuberculosis were destroyed, and if the bodies of all human beings and animals dead of the disease were incinerated or otherwise rendered innocuous, there would at once result an enormous diminution in the ravages of this great plague, and it would not be too much to hope for its ultimate extinction.

Tuberculosis is, in the vast majority of cases, an acquired disease. There are, however, on record undoubted instances in which the disease has been transmitted from parent to child; but, as a rule, it is merely a predisposition that is thus transmitted, an impalpable receptivity or want of resistance, a constitutional vice of impenetrable nature. Whether the transmission be predominantly from the one parent or the other, or even if such transmission be not admitted, the child of tuberculous parents is likely in one way or other to be handicapped in the struggle for existence. For these reasons tuberculous persons should not marry, or, if married, they should not procreate. Tuberculous mothers should not nurse their own or other children, and tuberculous infants should not be permitted to nurse at the breast. Children are especially susceptible to tuberculosis, and they should, so far as possible, be protected from exposure to sources of infection. Tuberculosis in children localizes itself principally in the glands, bones, and joints.

Acquired tuberculosis is usually derived through the inspiration of tubercle bacilli with the air, or through ingestion with food or drink. Direct contagion is probably rare, though possible. The tubercle bacilli are expelled with the discharges of the tuberculous patient, and are not exhaled with the breath or given off from the skin or other surface. The disease thus, while not strictly contagious, is communicable from person to person, from human beings to animals, and *vice versa*; so that if the discharges of tuberculous human beings and animals, and the bodies of those dead of tuberculosis, were at once destroyed or disinfected, transmission could not take place. The principle thus expressed is the key-note of the prophylaxis.

In the large majority of cases of tuberculosis in man the lungs are the principal seat of the disease; usually the primary seat; often the only seat. Frequently the adjacent air-passages and the gastrointestinal tract are secondarily affected. No organ or tissue, however, may not be involved. The extension commonly is gradually

progressive to contiguous structures, but it may be sudden and wide spread by dissemination through the blood-stream. Finding lodgement under favorable conditions, the tubercle bacilli cause destructive changes, resulting in the breaking down of the invaded tissues. It is principally amid these surroundings that the bacilli abide, and it is through this medium that active organisms are set free and cast off and derive their power for further evil. If they be kept moist, the danger is minimized, as transmission usually takes place in consequence of the drying of the discharges with their conversion into dust and inspiration into the lungs. The possibility of direct infection, however, must not be overlooked. Access to the moist discharges by the lower animals must also be guarded against, not only to prevent their infection, but also the conveyance of infection through them. If these discharges could be at once destroyed by fire or other sterilizing agency, the danger of transmission would be removed.

In the case of the lungs the danger resides in the expectorated matters; in the case of the bowels, in the stools; in the case of glands, bones, joints, etc., in the discharges evacuated spontaneously or by surgical intervention. In any event, a proper care of these discharges will insure a restriction of the disease. It is therefore necessary that the sputum of the tuberculous patient be deposited in proper receptacles and receive suitable subsequent disposition, being burned or otherwise rendered sterile. Indiscriminate and promiscuous spitting cannot be too severely condemned. All public places should be amply provided with cuspidors, kept constantly moist and frequently disinfected. When coughing, the tuberculous patient should hold his hand or a cloth before the mouth, after which the one should be disinfected and the other burned. He may expectorate into cloths, which can be burned at once, or into a cup or other suitable receptacle kept constantly moist and frequently emptied and disinfected. The contents of these receptacles should be burned or otherwise sterilized.

If possible, a tuberculous patient should have not only his own bed-linen, body-linen, towels, etc., but also his own eating utensils, etc. The room or rooms in which he lives must be kept scrupulously clean, and frequently have, so far as possible, the benefit of sunshine and fresh air. From time to time the rooms should be disinfected, to reduce the danger from accidental contamination. This should

be done with especial care in case of death. The tuberculous patient should always sleep alone, occupying not merely a bed for himself, but a room for himself. The bodies of those dead of tuberculosis should be destroyed by fire. No other means of disinfection is so certain. If this be not possible, the body should be wrapped in sheets saturated with a strong solution of mercuric chloride or carbolic acid, and the interment should be at a maximum depth beneath the surface.

Tuberculosis of the bowel may result secondarily to involvement of the lungs, from swallowing of the sputum. It may also result by contiguity through adjacent disease, or from dissemination through the blood-stream. A not uncommon mode of origin is through the ingestion of contaminated food or drink. The milk of tuberculous cows is an especially fruitful source of this form of disease in children. While the milk and meat of tuberculous animals is not necessarily infected, the danger cannot always be excluded. They should therefore not be used as food. As, however, the existence of the disease may escape detection, it is a wise precaution that milk should always be thoroughly boiled, and that meat should always be thoroughly cooked. The practice of drinking blood at abattoirs, as practised by some, should be strictly interdicted. In persons predisposed by heredity, by unhygienic surroundings or other depressing influences, or by association with tuberculous patients, the preventive precautions ordinarily observed should be enforced with redoubled vigor. Briefly stated, the prevention of tuberculosis consists in the application of those principles of asepsis and antisepsis that have revolutionized the science and art of surgery.

I have purposely refrained from the use of the words "consumption" and "phthisis," deeming that they no longer convey a proper conception of the nature of the disorder under consideration. If the experience of years has taught anything, it has shown, on the one hand, that tuberculosis is not necessarily a fatal disease or attended with wasting, while, on the other hand, both of these events characterize a number of other disorders.

I am in favor of the erection of hospitals for tuberculosis, for the care of those unable, through ignorance or poverty, or both, to care for themselves, and who are thus a constant menace and a perpetual danger to the health of a community, and particularly to those immediately around them; and for the purpose of providing those pos-

sessing means with all the resources and paraphernalia for the treatment of a disease which we have learned to recognize as both preventable and curable. I am in favor of the registration with boards of health of cases of tuberculosis, in order that information may be disseminated as to the modes by which the disease is transmitted and the best means by which such transmission may be prevented, and general suitable hygienic measures instituted. In this connection it may be stated that the liberties and the privileges of the individual must be subordinated to the welfare of the community, the effectuation of the greatest good to the largest number.

In conclusion I would present the following summary:

1. Tuberculosis is communicable.
2. Transmission takes place principally through the inspiration of the dried products of the disease-process,—sputum, stools, pus; and of the secretions and tissues of diseased animals,—milk and meat.
3. Mere association is not sufficient for transmission.
4. The surroundings of the tuberculous patient are not necessarily infected.
5. Tuberculosis is preventable.
6. Its spread can be restricted by destruction or sterilization of the discharges.
7. Indiscriminate and promiscuous spitting should be prevented.
8. The use of meat and milk of infected animals should be interdicted.
9. School-children and the general public should be informed of the mode of transmission, and instructed in the means of prevention.
10. The purity of the water-supply should be assured.
11. House-to-house inspections should be made from time to time.
12. The dissemination of dust should, so far as possible, be prevented.
13. Parks and other open places should be provided in every large community.
14. The bodies of those dead of tuberculosis should be incinerated.
15. Cases of tuberculosis should be reported.
16. Hospitals for tuberculosis are a necessity.

THE DIFFERENTIAL DIAGNOSIS OF TYPHOID FEVER, WITH ESPECIAL REFERENCE TO THE DIAZO-REACTION AND THE AGGLUTINATION TEST OF WIDAL.

CLINICAL LECTURE DELIVERED AT THE CITY AND COUNTY HOSPITAL.

BY CHAS. LYMAN GREENE, M.D.,

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GENTLEMEN,—The impression that typhoid fever is easily and certainly diagnosticated is far too common with students and with a large body of practitioners, and you have no doubt come to consider such cases as I have shown my ward class to-day as of little interest in comparison with those illustrating the rarer forms of disease. Permit me to assure you that such a view is erroneous. No disease is at times more difficult to diagnose accurately in its early stages; no one more interesting and protean in its forms; no one more difficult to prognosticate, and few more exacting in their demands upon the therapeutic resources of the clinician. By this I do not wish you to understand that all cases are difficult; some are remarkably clear in their development, run an uneventful course, and would get well without any treatment; but I wish to put you on your guard against the atypical cases, in order that you may, on the one hand, avoid that over-confidence in text-book symptomatology which begets imaginary typhoid epidemics, and, on the other, that failure to recognize unusual forms of the disease which is a frequent source of humiliation to the young practitioner.

I shall speak to-day only of the points by which we are guided in differential diagnosis, wholly disregarding etiology, pathology, and treatment. The symptoms characterizing typhoid fever are,—

1. An insidious onset.
2. A continuous and somewhat characteristic temperature record.

3. Tumefaction of the spleen.
4. The appearance of rose-spots upon the abdomen or other regions.
5. A disturbed pulse and temperature ratio.
6. The recovery of the typhoid bacillus from the stools, blood, or urine.
7. The diazo-reaction.
8. The agglutination test of Widal.

There are, as you know, various other symptoms, such as nose-bleed, gurgling and tenderness in the right iliac fossa, the typhoid tongue with its V-shaped red tip and edges, the color of the stool, and the more serious symptoms of complicating hemorrhage and those terrible signs which herald perforation. Let us discuss, first, a typical case; secondly, the variations frequently seen and the value of individual symptoms; thirdly, differentiation.

In a typical case there is first a period of *general malaise* (*lassitude*, aching head and limbs, etc.), during which nose-bleed may occur, with diarrhœa or constipation, more generally the latter. This condition progressively increases, and slight fever appears, the patient soon taking to his bed. The fever now increases in a somewhat characteristic manner, rising higher each night than the night preceding, receding each morning about one degree below the temperature of the preceding evening. The face has now become flushed, the tongue is heavily coated save at the tip and margins, which remain a bright, angry-looking red. The diarrhœa may now increase or replace precedent constipation, there is mental hebetude, and the pulse, heretofore somewhat slow and soft, becomes weaker and perhaps dicrotic; at the end of a week or ten days in a certain proportion of cases the pale-red papules or "rose-spots" appear over the abdomen and lower chest, and the spleen may be readily palpable. At the end of the second week the fastigium is reached and all symptoms are intensified. Low muttering delirium replacing hebetude and headache, the pulse growing more rapid and dicrotic, heart-sounds weaker, tongue becoming dry and hard, and sordes tending to accumulate upon the lips and gums. The pea-soup stool of the earlier period is replaced by the bright ochre stool of typhoid, and tympanites may be excessive. During the third week the temperature shows but slight diurnal variations. Nervous symptoms are intensified, hemorrhage or perforation may occur, and there is

a marked tendency to hypostatic pneumonia, or more properly, perhaps, a broncho-pneumonia. The fourth week is usually marked by a recession of the symptoms. The fever gradually subsides, the mind clears, the spleen shrinks under the ribs, the tympanites lessens, and the pulse is of better quality and less frequent. Such a case offers but little difficulty in diagnosis; but let us consider the departures from the classical symptomatology.

Period of General Malaise.—This may be lacking altogether, the disease being inaugurated by a chill and high fever.

Nose-bleed is by no means a constant symptom, nor is it confined to typhoid fever.

Gurgling and tenderness in the right iliac fossa is found in most diarrheal conditions, while marked localized tenderness in cases of sudden onset suggests appendicitis rather than typhoid. Moreover, cases of typhoid occur in which neither symptom is present.

The Typhoid Tongue.—The tongue with the bright edge and V-shaped red area at tip is common in typhoid, but not invariable, and occurs frequently in other conditions associated with high fever and gastro-intestinal derangement.

The Fever.—Cases of step-ladder temperature are rarely seen in this section of the country, and nowadays the use of cold baths and antipyretics has robbed it of much of its diagnostic importance. Moreover, as before stated, the temperature may rise rapidly after the chill instead of gradually as in our typical case, and instead of persisting throughout a period of four weeks or more, may last but a few days, such cases being those of true abortive typhoid.

Still more extraordinary are those cases without temperature, the "afebrile" typhoids which have been reported by some clinicians, and show a high percentage of mortality (fifty per cent.).

Diarrhœa is present only in a minority of the cases, regular movements or constipation being the rule.

Rose-spots, when present, are valuable diagnostic aids, but they are absent in many cases and so profuse in others as to lose something of their characteristic appearance, and are not absolutely confined to typhoid. One case occurring in our wards which presented typical rose-spots was shown by autopsy to be a case of acute miliary tuberculosis. Another with very well marked eruption was cured in twelve hours by a dose of calomel, and was no doubt simply a catarrhal enteritis.

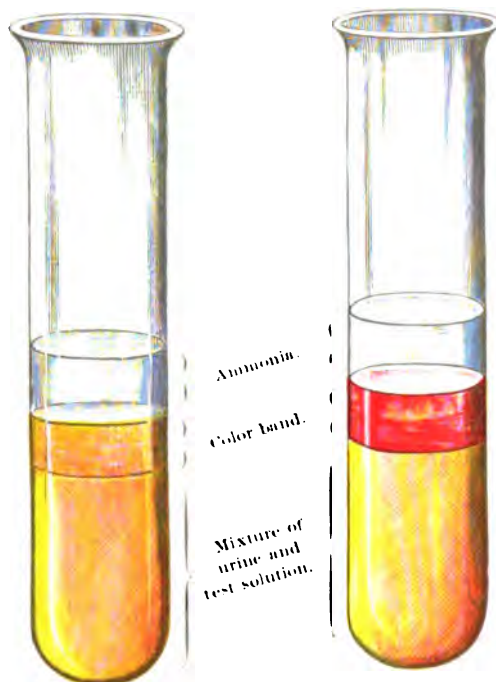


FIG. 1.—Reaction absent. Orange band at junction point.

FIG. 2.—Reaction present. Crimson band at junction point.

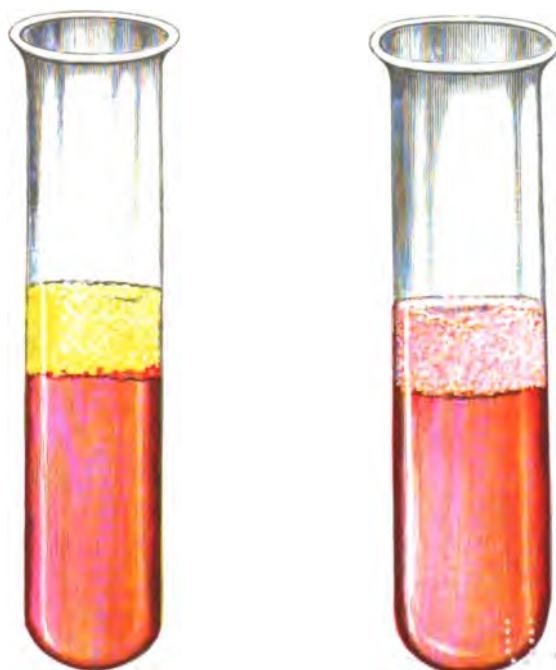


FIG. 3.—Pseudo reaction. Appearance after shaking. Yellow foam negative reaction.

FIG. 4.—True typhoid diazo-reaction. Note the pink or rose-colored foam.

(From drawings by J. H. Stewart, M.D.)

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Enlargement of the Spleen.—This is a very valuable sign when the spleen is palpable and associated with the general symptoms of typhoid, but is unfortunately common to typhoid, acute miliary tuberculosis, malaria, and septicæmia, and, moreover, is often concealed by reason of an existing tympanites.

Disturbed Pulse and Temperature Ratio.—Much stress has been laid by some authorities upon the fact that the pulse variations do not keep pace with the variations in temperature. In connection with other symptoms, this one is of some value, but equally great variation may be met with in other diseases, such as pneumonia, and in persons with an obstructive aortic lesion or stiffened vessels, suffering from acute disease. It is, however, a fairly constant symptom.

The Recovery of the Bacillus from the Stools, Blood, or Urine.—As this involves cultural methods of a very delicate kind, it is a matter of considerable difficulty, and furnishes reliable results only in the hands of the most expert bacteriologists, even Elsner's method being far more difficult of application than is generally supposed. Spleen puncture, which will often yield pure cultures, is hardly a justifiable procedure, and the blood and urine do not constantly yield the germs.

The nervous symptoms are simply those of the typhoid state, and may be seen in any disease where the toxæmia is profound. They may, moreover, be so greatly intensified in typhoid as to closely simulate a meningitis. Acute maniacal delirium is an occasional and very fatal complication, and true insanity, most frequently melancholia, may also occur.

There is a form of typhoid associated with profuse and exhausting sweats simulating ulcerative endocarditis and malaria. Often-times the onset is distinctly pulmonary in its type, and the diagnosis of pneumonia is made, the precedent or coincident typhoid infection being overlooked. Then there is the light form, running a course of from eight to fourteen days, and the abortive form, with sudden onset, violent symptoms, and rapid recession, which has already been mentioned. There is the tonsillo-typhoid form, often accompanied by erythema and simulating scarlatina. Again, there is a renal form and the variations due to complicating abscess and necrosis, or that in which a pseudo-diphtheritic membrane appears in the throat.

I might still further multiply the proofs of the protean nature of this most interesting disease, but have, I trust, mentioned enough to prove that the diagnosis is often far from easy. Two symptoms have been reserved for separate discussion because of their great importance in differential diagnosis,—

1. Ehrlich's typhoid diazo-reaction.
2. The agglutination test of Widal.

The former was introduced by Ehrlich in 1882 as a diagnostic sign of typhoid, and after a most eventful career has finally become well established in nearly every clinic as an important diagnostic test. You will find in my papers—"The Diagnostic Value of Ehrlich's Diazo-Reaction,"¹ and "Recent Aids in the Differential Diagnosis of Typhoid Fever (describing the author's modification of Ehrlich's test, with a preliminary report upon the serum test of Widal)"²—a more extended description of this test than the limits of this paper will permit. Suffice it for our present purpose to say that the test used and recommended by me is that of Ehrlich as modified by C. E. Simon, of Baltimore, and myself. The test solutions are as follows:

Solution A.—Hydrochloric acid, 50; distilled water, 1000; sulphanilic acid, q. s. ad sat. (should be *thoroughly* saturated).

Solution B.—Sodium nitrite (*not nitrate*), five-tenths-per-cent. (one-half of one per cent.) solution in distilled water.

Solution C (Test Solution).—One hundred parts of *A* plus one part of *B*.

The original test solution of Ehrlich was made by adding to forty parts of Solution *A* one part of solution *B*. This I have modified by using one hundred parts of *A* to one of *B*, with the effect of eliminating many disturbing factors and doubtful reactions. Dr. Simon suggested the ring method of testing described below.

To apply the test, take equal parts of "*C*" and the urine. Shake thoroughly, and allow aqua ammonia in excess to run gently down the tube so as to overlay the mixture below. If the reaction be present a deep-red band, such as is represented on the annexed plate (Fig. 2), appears at the line where the ammonia meets the mixture, *and when shaken it yields a pink or rose-colored foam* (Fig. 4). To

¹ Journal of the American Medical Association, February 24, 1894.

² Medical Record, November 14, 1896.

the so-called secondary reaction—*i.e.*, a green precipitate after several hours—I shall make no further reference.

The following rules must be carefully observed:

1. Use fresh urine.

2. See that the reaction is acid and the urine filtered.

3. Use a fresh test solution.

4. Keep the sodium *nitrite* solution in a black bottle and in a cool place, and renew it frequently. The sulphanilic solution keeps indefinitely.

5. Hold your tube near but not against a white background, the source of light being behind you. Artificial light is not to be used.

6. Accept no color but a distinct red, and *regard no reaction as a true one in which the solution when shaken does not yield a pink foam*. Pseudo-reactions occur in which the band is of the proper color, but the foam is yellow or brown. The most absurd errors have arisen from a failure to observe the exact technique here outlined, and some excellent men have used sodium nitrate, weak ammonia, or even omitted the addition of ammonia altogether, and naturally failed to get any reaction at all. Others have admitted yellow and orange-color reactions, or even used a five-per-cent. solution of sodium nitrite, and have consequently found it in everything.

The test is not pathognomonic, as was originally maintained by Ehrlich, but is constant in all *severe* forms of typhoid, appearing sometimes as early as the fourth or fifth day, though more generally at the end of the first week or ten days, and persisting until the fever begins to decline. It is absent in malaria, appendicitis, pneumonia, and the earlier stages, at least, of acute miliary tuberculosis, occurring only, in my experience, in some of the exanthemata, in certain cases of advanced malignant disease, and in febrile cases associated with septic absorption. Pseudo-reactions are found in a considerable number of such cases.

It is consequently of very great value, not alone as a positive sign, but still more as a negative one, for it is my firm belief that it will be found to be present at some stage of all severe cases of typhoid, and that its persistent absence in any such case pretty surely negatives the diagnosis of typhoid.

I have placed last the sign of most recent date and greatest importance, one, in fact, which is perhaps more important than all other signs combined,—*viz.*, the agglutination test of Widal.

For the original report of this test you will consult the *Bulletin Médicale*, 1896, p. 618, the first papers on this side of the water being those of Wyatt Johnston, of Montreal¹ (*New York Medical Journal*, October 31, 1896), and my own papers² (*Medical Record*, November 14, 1896, and December 5, 1896).

The genesis of the test is traced to the discovery by Pfeiffer, in May, 1894, of the fact that cholera vibrios mixed with the serum of an immune animal, and injected into the peritoneal cavity of a guinea-pig, lost their motility and changed their form. Later he found that typhoid germs acted similarly with the serum of the blood of typhoid patients, and applied the test to distinguish the germ; but it was first applied to diagnosis by Widal in June, 1896. There is already an immense amount of literature bearing upon this test, which is, in fact, attracting more attention to-day than any other diagnostic procedure. The general opinion seems to be that the test is as nearly pathognomonic as any disease symptom can be, but I cannot help thinking that over-refinement in technique is leading to some confusion of mind and robbing the general practitioner of a means of diagnosis capable of being easily and quickly applied by any man who has a good microscope and the ability to use it, with some additional knowledge of the rudiments of bacteriological technique, sufficient, at least, to enable him to keep a culture-tube uncontaminated. I shall describe and recommend my own method of testing as being the simplest known to me and requiring the least apparatus and smallest expenditure of time.

The Test.—Place upon a clean glass slide one drop of water as measured by the ordinary medicine-dropper. Touch with the sterilized platinum loop the growth of typhoid bacillus in an agar tube. Stir thoroughly into the distilled water the small particle adhering to the loop. Prick the patient's finger and touch the resulting drop with the sterile loop. Stir this film of blood into the emulsion of germs on the slide, drop on a clean cover-glass, and examine. The advantages of this procedure are (a) that it does not consume five minutes; (b) that it insures a dilution of about one to ten; (c) it insures a prompt reaction by reason of the thin film and small amount of materials used. The loop used should be one-eighth inch in di-

¹ On the Application of the Serum Diagnosis of Typhoid Fever to the Requirements of Public Health Laboratories.

² Recent Aids in the Differential Diagnosis of Typhoid Fever, etc.

ameter. A control slide of water and germs alone should be prepared at the same time to test the motility of the germs, and this motility should be only moderate, Johnston having found the rapid darting motion to be accompanied by deficient resistance. If dried blood be used, *a single drop* of blood should be allowed to fall upon the slide and dry there. To make the test a drop of distilled water should be added to the smear and thoroughly stirred, and a loopful of this mixture used instead of the fluid blood. If the case be one of typhoid fever, the germs lose their motility and gather in groups throughout the field, as shown in the specimens which you have seen me prepare. It is said by Widal and others that even dead germs will become grouped, and he suggests the use of a culture which has been killed by the addition of formalin, when live cultures are not easily obtained. The test with fresh blood is much to be preferred to that with dried blood, the reaction being better and more rapidly developed.

The reaction should be well marked within half or three-quarters of an hour, and if such a time limit be observed and all tests made to conform to it, there will be less difficulty and misunderstanding, rapid work and decisive results being the desideratum. Grouping in a well-marked case commences almost instantaneously, and is often well under way by the time one has focussed the preparation.

In the paper¹ published in the *Medical Record* of December 5, 1896, I called attention to the fact, not hitherto observed, that even the naked eye would suffice to detect the grouping in cases where the reaction was well marked, the cover glass appearing smoky, and this haze being seen upon closer inspection to be due to tiny flecks representing the groups (Figs. 5 and 6). This is easily seen if a fairly large number of germs be used in testing.

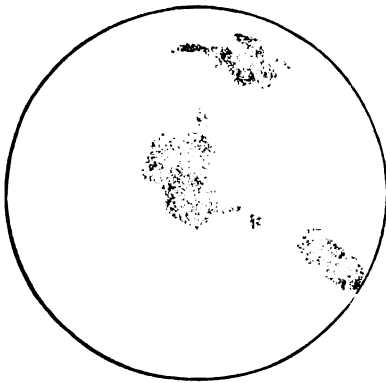
I wish at this point to again emphasize the importance of simplicity of technique and to protest against some of the elaborate methods at present in vogue which tend to limit the use of the test to the laboratories. I fully appreciate the value of careful laboratory method, but in this case much of the very elaborate technique is not only unnecessary for the clinician, but has unquestionably led to errors in observation. For example, most experimenters prepare a fresh and virulent bouillon culture from the stock cul-

¹ The Serum Diagnosis Test of Widal and the Possibility of its Application without Microscopic Examination.

ture for each day's testing, though I believe that the older and more sluggish germs are far better for the test, because of their greater resistance. My own cultures upon solid media are kept and used without renewal for two weeks.

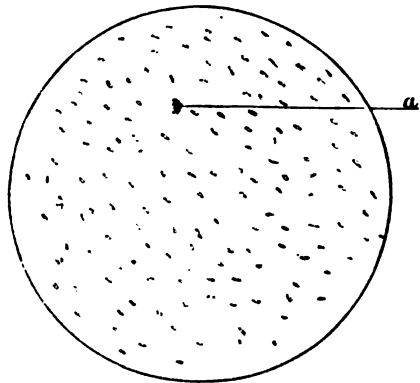
The hanging drop preparation is very generally used, but for clinical purposes has no real advantage over the flat method, unless you wish to watch the specimen for several days, which is not necessary in clinical testing. The placing of the mount in the incubator by reducing the resisting power of the germs becomes a fertile source of pseudo-reaction. The so-called exact dilution methods are necessarily complicated, and are little more exact than the

FIG. 5.



Showing agglutination of germs to form the characteristic groups or islands.

FIG. 6.



Germs separate and freely movable. No reaction.—a, accidental group.

method which I have outlined. The determination of the exact number of germs used is an over-refinement of technique, and impossible by any method adapted to the practitioner's use.

The careful sterilization of slides and cover-glasses is far less important than is their freedom from some powerful antiseptic. All slides and cover-glasses which have undergone chemical sterilization should be thoroughly washed to remove any of the antiseptic material. One source of error is especially important and should be corrected. I refer to the collection of blood upon paper or card-board for purposes of examination. A method prevalent in most laboratories at the present time, though now discarded in our own State Laboratory.

I can say positively and without hesitation that blood so collected

does not react so reliably as that collected upon a smooth, non-absorbing surface, such as a glass, porcelain, etc. I have repeatedly tested this question by actual experiment, and am convinced that no absolutely accurate results are obtainable with dried blood if the paper be used.

Time of Appearance.—The reaction appears often as early as the fourth day, and persists for various periods, possibly in some cases for years. If proper methods are used, its appearance will seldom be delayed longer than one week. Some observers, however, have reported it as being greatly delayed in some cases, but the only cases in which I have observed any considerable delay were two in which the blood was sent in on paper. The reaction has been said to disappear and reappear at different times during the disease. My own experience has not, so far, been such as to confirm these observations, but it is well to bear the point in mind as indicating the necessity for repeated observations in non-reacting cases.

Allowing for possible error, I believe we are safe in assuming that ninety-eight per cent. of true typhoids will show the reaction, and he must be a bold man who can support an opposing diagnosis against the evidence it affords. This statement is more especially applicable to ward or bedside testing, where fresh blood is used. The work of boards of health or laboratories, where dried blood is necessarily used, will give lower figures. That the test is a great advance in diagnostic technique no one will deny, and, furthermore, I believe it will add greatly to our knowledge of the clinical forms of this disease if we will accept it at its true value and accept its teaching in a proper spirit of humility. In order to prevent possible misunderstanding, let me repeat that the only necessary materials for the test are, (a) the usual platinum loop having a diameter of one-eighth of an inch; (b) an agar culture of typhoid germs showing an active vigorous growth; (c) distilled water; (d) an ordinary medicine-dropper; (e) a microscope with moderately high power lenses. Oil immersion lenses are not a necessity, though desirable.

Remember that it is best to demand that grouping to a marked degree shall occur within three-quarters of an hour, discarding any mounts which do not react in this time and reapplying the test on subsequent days. That the sources of error are (a) use of impure cultures; (b) use of too young and virulent cultures with rapid darting movement; (c) incubation of mounts; (d) use of blood-serum

instead of the whole blood, which is more active and reliable; (e) collection of dried blood on an absorbent surface; (f) failure to allow loop to cool before taking up the germs; (g) the use of too concentrated a solution (some normal bloods will cause agglutination if the dilution be too slight); (h) the failure to invariably prepare a control slide without the addition of blood.

In my hands the test has given most definite and satisfactory results, and this fact is, I believe, due in large measure to the extreme simplicity of the method of applying the test.

In discussing differential diagnosis I shall briefly mention only the important diagnostic features.

Acute miliary tuberculosis differs from typhoid in the presence of a leucocytosis if there are foci of suppuration, irregular temperature, chills, and sweats, the temperature being often of inverse type; by rapid emaciation, absence of rose-spots, the absence or late appearance of the diazo-reaction (not before the third week, Simon). In three fatal cases I have observed no true reaction; delayed enlargement of the spleen; absence of Widal's test. The last *may* be the only absolute means of differentiation. It should be remembered that typhoid may exist as a complication of acute tuberculosis.

Septicæmia is differentiated from typhoid in the discovery of a focus of suppuration, irregular temperature, chills, and sweats, or, if latter are absent, a marked leucocytosis may point to a deep-seated suppuration. Here, also, it is often impossible to positively differentiate except by the failure of Widal's test. Tuberculosis, salpingitis, ulcerative endocarditis may be included here.

Appendicitis in the absence of tumor is at times only to be positively differentiated from typhoid with acute onset by (a) diazo-reaction; (b) Widal's test. It is, of course, readily distinguished from the common form of typhoid.

Meningitis is sometimes only to be distinguished from the cerebral form of typhoid by the absence of rose-spots (not positive), absence early in the disease of diazo-reaction, and by the failure of Widal's test.

Simple continued fever is at times to be positively differentiated from the typhus *Levissimus* only by the diazo-reaction and Widal's test.

Pneumonia, with a high degree of toxæmia leading to the typhoid state, is distinguished from the pulmonary form of typhoid

by the presence of leucocytosis, an absence of rose-spots, of a diazo-reaction, and of Widal's test.

Malaria may now be readily differentiated by the finding of the plasmodium in the blood, the absence of the diazo, and of Widal's test.

These diseases are constantly confounded, and malaria, as Osler says in a recent paper, is often wrongly called typhoid north of Mason and Dixon's line, while south of it typhoid is more frequently misnamed malaria.

Colon Typhoid.—Johnston, of Montreal, has found that certain cases of continued fever, with strikingly typical typhoid symptoms, may fail to react with the typhoid bacillus, but show a marked reaction with the colon bacillus, a most interesting and valuable addition to our knowledge of the disease, and one affording an explanation of some of the apparent failures which have been reported. It should certainly throw more light upon those interesting cases of typhoid infection which are not the "typhoid fever" of the books.

An interesting case in our own wards gave a beautiful reaction, but had lacked intestinal symptoms. The autopsy showed quite conclusively that the case was one of typhoid infection, affecting chiefly the spleen and mesenteric glands, but without marked involvement of Peyer's patches. This may serve to emphasize the statement that the mere fact that an eminent clinician diagnoses typhoid and the test fails does not prove the test wrong.

The logical basis upon which it rests and the known fallibility of purely clinical methods place the burden of proof upon the shoulders of the objector, who must first show proof of the proper performance of the test, and, secondly, adduce post-mortem findings verified by cultural methods.

So, in closing, let me earnestly recommend that you use in your future practice the two tests which have been especially recommended, and that you use them carefully and understandingly without permitting any general symptomatology, however striking and convincing it may seem to be, to lead you into a hasty condemnation of the tests. Both may prove fallible, but not, I am sure, to the same extent as are our own clinical judgments, and rightly used you will find them to be extremely valuable aids to correct diagnosis.

Neurology.

THE REPAIR OF WILL-LOSS.

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LECTURE III.

GENTLEMEN,—In two previous lectures the subject of will disrepair is set forth along with the elements of procedures by which they may be handled to obtain good or it may be only moderate success. There follow sketches of obstinate and involved cases offering suggestions to those similarly puzzled. The following case exemplifies well the perplexities in dealing with a man of rugged intelligence, clear legal abilities, successful in the pursuit of his profession, of dominant, aggressive will, rejoicing in his work, and unmindful of possible disasters, who is suddenly overcome in the heyday of his powers by so simple a trouble as insomnia. The cause of the insomnia was the common one of accumulated strains (which in themselves would not damage), although the unremitting character of his work led him to take almost no rest, so necessary in one verging upon middle life. On top of this comes a series of worries connected with his professional work but of an exceptionally distressing kind, and finally the prolonged illness and final death of his wife.

Soon after this a very important legal case arose, into which, contrary to the advice of his physician, he plunged. His associates began to notice that while his intelligence remained clear and his forcefulness abundant, nevertheless, in the brief intervals, while in the heat of the contest, he turned to them and discussed these minor

worries alluded to, which clearly occupied his attention to the exclusion of more important matters. He also superadded to them increasing gloominess about his financial affairs, for which there was no demonstrable cause. Presently he admitted to his friends that he was sleeping badly, and that these worries aggravated this. Then at night he began to pace the floor and rail at fate, becoming enraged at the affliction which he declared would kill his usefulness. Although advised to give up the strain of the legal work and take a rest, he scouted the idea and stuck doggedly to his efforts, until the business in hand was seriously jeopardized and he finally gave up.

The physical condition of this gentleman had not apparently suffered. The period of time when he became most indisposed was during a spell of protracted heat from which he suffered exceedingly. A minor factor, and yet an important one, was his habit of conventional dress, thus aggravating to a very serious degree the effect of heat upon himself. At last he received a particularly disagreeable piece of news, and fell fainting in his office. The description of this attack is that of a case of genuine heat exhaustion with collapse, feeble pulse, etc., from which he quickly recovered and went to his home. He then took a little rest, going into the country, fretting constantly, and insisting upon returning to his office, and finally did so, and again had it demonstrated that he could not think consecutively, that his judgment was staggered. Hereupon a great horror arose, and he started upon the first of a series of pilgrimages to various distinguished physicians, who advised him (as is now proved, by no means wisely), some of them allowing him to return to work before the proper time, whereupon he was again horrified at his inability to control his mental processes. Consulting yet a higher authority (the highest he could find), he was given some remedies for his sleeplessness, massage and general measures, and urged to take a sea voyage. This was a dismal failure, he behaving like a caged lion more than a first-class passenger, and by and by drifted back to the old doleful state. Each time this last was done the disastrous effects were so evident that he at last consulted the highest authority in the land, who insisted upon his taking a young medical man and making a tour through Europe. Upon the ocean he found his nights most horrible. The young medical man (who, by the way, failed to use any hypnotic drug) became alarmed, thinking his patient a violent maniac, and from his description and from my own

subsequent experience with some of these episodes I should undoubtedly agree, only that the type of his maniacal attacks was precisely such as one might expect from one of his irascible temper, abounding in explosive energies when brooding upon his wretched plight during the half-dreaming states of the small hours of the night.

The intended tranquillizing journey through Europe had some of the stage effect of a raid of the ancient Goths. Under the tutelage of his timid bear leader, and after an uncomfortable rush through a previously made itinerary, he brought up in London and consulted a medical man, who did give him some good advice and defined his condition as "*melancholia progressiva excessiva*," and advised a speedy return home. His next experiment was to take lodgings in an out-of-the-way haunt in Virginia, where for four months he rode horseback, disported himself generally in the wilds, and made, according to his own accounts, the inhabitants of that region the miserable recipients of his most impatient confidences. However, he had learned to sleep a little, and finally his landlady informed him that she could no longer take the responsibility of keeping him.

And now, nearly a year having elapsed, under the advice of some of his friends, he consulted me, with the positive statement that this was his last occasion for accepting medical advice, and if I failed he should most undoubtedly do away with himself, for the limits of his endurance had been reached. I felt the responsibility to be a grave one. He had already deliberately attempted suicide by taking morphine, and spasmodically in other ways had jeopardized his life. Fortunately, a closely attached friend who knew a great deal about him came with him, and gave me many important sidelights as to his history and habits, and I insisted that I should be allowed full authority to do what must be done, and that the patient himself be obedient to any course of action which, after deliberate study of his needs, he and I might mutually agree upon. It must be borne in mind that this man had repeatedly received the very best expert advice from the leading neurologists in three cities of this country and two in Europe. None of these men had taken time, in my judgment, to study the matter sufficiently. None of them had been able to discover anything seriously amiss with his bodily organs, and after thorough search I came to much the same

conclusion. His friends had urged upon him that I should use a full course of rest treatment, but his great bodily strength made this not only unwise but practically impossible. I found constipation and a somewhat inactive liver, an enormous amount of uric acid, but splendid organs. Perfect eyes, teeth, heart, and lungs; no bad habits nor appetites; never any use of alcohol or tobacco, nor abuses of any kind except in the matter of legitimate work. I began, under favorable auspices, to treat him with rest in body, antilithic diet, brisk mercurial purgation followed by Carlsbad salts, the drip sheet every night, massage and electricity during the day, and began a series of experiments upon hypnotic drugs. He had taken a lot of sulphonal and trional, and these, while giving shallow sleep, produced most hideous depression.

It may be interesting to summarize the results of these medicines. Bromides did nothing at all. Hyoscine hydrobromate, along with nitroglycerin, in very large amounts, seemed no more than bread-crumbs. Several other hypnotics were in vain. A mixture of chloral, lithium bromide, and hyoscyamus did produce sleep without disturbing effects, and upon this for a time we relied. Now, the indications for treatment in this case were in brief as follows:

This gentleman needed a constant companion who would be more than usually careful, tactful, and agreeable. The danger of committing suicide was certainly grave. Relief was to be expected through clearing out his system of those toxic principles which accompany uricacidæmia. The chief need was systemic, constant and increasingly violent physical exertions, which should be unremitting, but if possible agreeable. The gentleman had, unfortunately, no tastes whatever that I could discover for anything except the practice of the law. The difficulties were grave. By and by there came a crisis in our relationship, and these, it is well to remember, frequently occur, and success or failure depends entirely upon whether we can meet these exigencies in such a way as to start out afresh in the right direction. The strong remnants of discontent at all measures which had ever been used, by me or others, culminated one day. He had been behaving in such a crazy fashion that I felt it necessary to give him a good, square talking to. I told him plainly that what I had now to say might probably offend, but if he had a ray of common sense left, or any judgment, he would recognize not only that it was thoroughly well meant but should have

the best effect. I told him plainly that the reason why the various physicians he had previously consulted had sent him, some to Europe, some to the Bermudas, some to the mountains, etc., was because such was his overwhelming wearying demands upon the physician's time, attention, strength, and patience that few would endure it; that for my own part I was prepared to let him go since he was discontented. Meanwhile, I emphasized very clearly that if he made this move it would certainly be harmful. I told him that I was ready to let him go home as he desired, but that I expected him back in a week, and the reason why I especially urged his going was that I was credibly informed that among his friends at home he was now supposed to be violently insane and in an asylum. I showed him that it was a reasonable inference from his actions, and that to save his reputation the best thing he could do was to go back for a week or so, show himself at his office and his usual haunts, and, above all, to lay such restraints upon himself as to act and speak like the sane man that I hoped he was, and then if he chose he might come back to me, but for my part I was indifferent. This undoubtedly sobered him and made the most important impression upon his consciousness so far accomplished by any one. A long fight ensued covering months, but the result was satisfactory.

As in strong contrast to the previous case, I will relate a few circumstances connected with the history of a gentleman of early middle life, of the most refined and gentlemanly instincts, but whose antecedents had been people lacking in force, both mental and physical, and who gave this man when a boy little or no direction except that of a pleasant Southern home, where he grew up to be an idler, a pet with the ladies, a man highly esteemed in social circles, and finally became that anomalous creature, a club man. He was bred to the law, and occupied, until the time of these circumstances, an official position where his duties were light and his salary certain so long as he could stagger back and forth to his office.

As he came to me, I found a tall, thin man, well dressed, and of perfect manners, acquiescent, quiet, gentle, who could say little about his bodily ailments except that he was in a condition of great distress of mind which had reacted upon his body, interfering with appetite and nutrition. He was quite willing to admit that he had been a sad, weak dog, that he had lived high, had ruffled with the best, and had played the very devil generally. He had never been

particularly cheerful, and had always cut a rather melancholy figure in the society in which he moved, and I am inclined to believe had posed as rather a pathetic character. One thing was certain: he was a most perfect gentleman in manners and instincts, just the kind of man every one liked and would go a long way to serve; the kind of man whose friends always take care of him, provide him with amusements, shield him from harm, and love to have him about, as the English would say, "like a tame cat on the premises." I really could not find any adequate cause for his disturbances. Ten years before, he had broken down with some kind of nervous attack, and after it he had constantly been in great concern about himself, and expressed a fear that he might some day be under the necessity of putting an end to his life, this more or less pleasant life, and be no more.

As an indication of his characteristics, this: when I was once striving manfully to rouse him up and get him to look upon life as a battle-field, or, at least, as a garden wherein all should labor, he replied, with the semblance of a tear in his eye, "But, my dear doctor, you really do not understand my condition. I could not do such things. Why, I am as timid as a little frightened bird."

This really very attractive gentleman was exceedingly appreciative of everything done for him, and yet accepted it all as a matter of fact. Somebody had done this for him all through his life; and while he never failed to thank you in the sweetest way, he would allow you to do any mortal thing for him you were willing to do, and help himself only so much as was consistent with good manners. His heart was rather weak, his hearing poor, there was some catarrhal condition in one nostril, but all these points were attended to. His blood was not seriously below par, his kidneys were sound, and as to his appetite, in his opinion very small, nevertheless, an adequate amount of food could be consumed, and this was supplied and enforced. I put him to bed for quite a while, and tried my very best to fatten him. He was over six feet and only weighed one hundred and thirty pounds, but in three months' time, using every effort that forced feeding, rest, and nutritive tonics could supply, I was unable to get any adequate gain in flesh, but I constantly endeavored, by working myself into his confidence and esteem, to rouse him into something like the semblance of effort, and sometimes I thought I had almost succeeded. Piqued by this, I made still greater efforts, so much so that at times I came away exhausted as one might be by

an hour spent in trying to stand a fathom of rope on end, partly by moral suasion and partly by hypnotic suggestion. I often wished for Charcot and hypnotism, but I am convinced that he could have done little more than I did. Week after week I strove faithfully. He gained in bodily strength and in cheerfulness. In six weeks he could smile and appreciate some of my most brilliant passages of wit.

The results in this case were rather better than might have been expected. I was particularly fortunate in having as a most faithful and able coadjutor a nurse who took a genuine liking to the man, and who strove far more on personal grounds than on any thought of reward to serve him faithfully. This nurse did magnificent work, leaving literally no stone unturned by night or day, accompanied him subsequently to the sea-shore, where the good work was carried on; for the good work finally was carried on to a reasonable point of success.

This gentleman is now attending to his work. The letters we get from him give evidence of mental and physical progress, and I think there has been done for him about as much as could be done, and that the foundation for future progress was well laid.

The following subject is one I approach with considerable trepidation, because in using the facts it is almost inevitable to allude to circumstances which, if generally known, might offend those immediately concerned, and yet I can see no good reason why a proper use of them in outline should not be made, since they illustrate how exceedingly difficult it is to deal justly and wisely with those complicating conditions which arise in exigencies of modern civilized life, but which demands above all others proper interpretation to enable those who suffer to be restored to normal conditions and usefulness.

The lady in question I have known since she was a young girl, delightful, beautiful, with everything to make life happy. I know from observation some of the circumstances which saddened her life, and fifteen years afterwards I learned more from what she herself told me, although never in detail and only the bare facts. I know, in brief, that a cloud came over her, the result of those inevitable yet errant and hopeless attachments which the human female sometimes unwittingly drifts into.

It does not matter what was done, further than that two people found that their attraction for each other could never result in what

was desirable, and that the shadow cast upon my patient's life was deep and far reaching. The world saw, made cruel inferences, and blamed her, or, at least, so she thought. The effect of this was that she ceased to be in the world, withdrawing both from its delights and offences, and, most naturally, sought refuge in the church, and yet her form of religion did not provide that complete, refining, and restful condition which is afforded to those of the Romish faith and which are so satisfying to many and so refining to the individual. Be that as it may, the church, with its observances, with its possibilities, its states of ecstasy, of self-abnegation and chastisement, its spiritually refined qualities wrought out through fasts and lenten vigils, produced a marked alteration on a character spiritually attenuated, but meanwhile tending towards physical destruction. Since complete renunciation of the world was scarcely possible, this sweet woman was exposed to many of the earthly annoyances which come from dwelling in it and being of it, although her heart was far removed. She could feel that her worldly friends and even her own family could not put themselves in her place mentally and understand her attitude; knowing little, they were content to blame where they failed to understand. She saw herself viewed askance by those who could not appreciate her position and who treated her according to their narrow pragmatic views, which were all wrong, and nearly all different, yet with one consistent attitude of blame. Soon a physical calamity grew and strengthened. Her hearing became impaired, and this still further cut her off from human intercourse and wholesome sympathy.

I have but faintly sketched out the numberless developing causes which in their infinite combination and complexity produced an effect upon an originally refined, eager, emotional temperament by persistent misconception on the part of even her most intimate friends.

Originally of exceptional vigor of mind and body, these both suffered until she had become an interesting wreck, which it was my privilege and duty to repair.

I began on a three months' rest treatment, during which time her physique was much invigorated and I learned her mental peculiarities. Through all the subsequent months and years that I had the honor of being her adviser I always enjoyed one inestimable privilege, and that was an intelligent co-operation, through which

alone we were able to gain and maintain progress. The tremendous difficulty was to show her family how important was the need of getting her out of the atmosphere of all this heart-breaking trouble, of these misconceiving friends and hypercritical family for a sufficient length of time. The question of finance arose, because such a case as this required an immense amount of money to get even moderate results. A nurse, and a first-class nurse, is demanded, and entire change of country. I made up my mind that at least we must get this sufferer to Europe for a year or more. This was a pretty large undertaking, and the patient felt it to be impossible. I heard talk of a grandmother who could do things if she would, but who viewed things very differently from most people and was pre-eminently practical. I seized upon the idea of myself talking to the grandmother, and this proposition took away the breath of all concerned, for she was held in high veneration and she maintained a very lofty and distant attitude. However, I "took the bull by the horns," made a bold plunge, and appeared before this excellent lady, talking to her in such a way that I insidiously suggested that her wisdom was large, but my patient was afraid to let me or any one talk to her about her needs, but that I in my wisdom knew better, feeling that these needs would be promptly recognized by so wise a person, who would also readily see how necessary it was that a complete severance should be made from all these circumstances and scenes. I told her that I was certain that she would at once suggest that no brief stay would be sufficient, but a year or a year and a half be necessary, and I felt that I could very confidently leave the matter to her good judgment. Thereupon I took myself off.

In a week's time the patient started abroad with her nurse and funds supplied by this wise and good-hearted grandmother, and was gone quite a year.

Progress was made, but no sudden, miraculous cure was effected. This paralyzed will-power had need of long and slow process for rehabilitation. The patient soon became dependent upon the nurse for everything, and came perilously near to being a moderately live parasite. Suddenly an accidental circumstance wrought for good. The nurse, in a remote and distant spot, fell ill, desperately so, and the patient had to turn to and serve her, which she did faithfully and well. I verily believe it was the turning-point of the whole case. This was the first round gained in inducing a self-reliant

action. Afterwards they travelled in many lands, shared responsibilities, as I instructed the nurse must be done to secure permanent effects.

The tendency to religious indulgences, one may literally say orgies of religious ecstasy, was the most difficult feature in this case, and had become the patient's chief and almost sole delight.

Europe, filled with objects of religious interest, was likewise strewn with perils, and yet steadily as possible she was weaned away from religious things and made to be of the earth earthy. This was no easy matter. On the way home there had been a deeply cherished scheme to visit certain holy fathers of a religious order she particularly affected, and, warned of this in time by the nurse, it required several tactful devices to turn her aside. Finally we resorted to cablegrams purporting to come from authoritative folk on this side of the water.

Once home again, improvement was conspicuous and gratifying, but the old atmosphere where the troubles began, where the physical and emotional troubles arose, slowly and steadily undermined the improvement until it became necessary to make another and entirely new start. Another year was spent with another nurse in travels here and there, which alone did little good.

A sojourn of several months in a quiet country place where the patient was interested in the simple pursuit of gardening, wherein she was induced to labor with her own hands early and late, wrought some effects, and again a return home was unfortunate. There was quite sufficient health of mind gained for the girl to be eager to take up the duties of life, which were light enough to be pleasant, and she could assist her family in housekeeping. Home duties were encouraged, her life was simple and happy, when suddenly and entirely against her will, she striving faithfully and earnestly, the physical strength and vigor gained by two years of toil and expensive measures ebbed slowly away and it was imperative to make a break for some distant place. Meanwhile, the nurse in charge had thoroughly learned her needs and capacities, although she had somewhat overrated the last. Indeed, it was one of the most interesting points of this case that the nurse and I had pitched upon too high an ideal, and had estimated too large a measure of capacity.

The patient could now do many things and enjoy life in diverse ways. To a casual observer she was much as other women are, and

most persons would have assumed her capacity restored to take her place in the minor affairs of life and its duties. Still, I had my doubts, and so had the nurse. Nevertheless, we attempted to let the girl go along by herself and in remodelled home conditions. By this time, I might remark, the family, a large clan much given to discussing each other's affairs, had gradually learned that my judgment was better than theirs, and they ceased a very natural opposition against proper treatment. Yet they wished the nurse to be dismissed. Quite willing to apply a reasonable test, the nurse was dispensed with, greatly to the reluctance of the patient, however, and she for the third time assumed the attitude of an ordinary citizen. It is possible that this experiment might have succeeded except for two or three unfortunate circumstances which arose, and afterwards an illness the nature of which to this day is a mystery to myself and to the consulting physician. I explained it upon the basis that while the intellectual faculties had reached a fair point of improvement and clarity, the will-power was unable to act as a balance, and small, unexplainable influences, such as are inevitable in the exigencies of modern civilized life, wrought more serious mischief than upon normal volition, and the result was the ebbing away of the powers of resistance. Above all, the organic activities seemed to cease their proper function. We had digestive troubles, especially constipation so severe that the combined skill of several of the highest authorities could make little or no impression. The nutrition failed so seriously that the simplest predigested foods were not retained. For weeks rectal feeding was demanded, and there came a time when life was utterly despaired of, when this poor soul was so low that she had received the final rites of the church and her spirit was ready to wing its flight. I had for a long time omitted the kindly scoldings which I had found of such salutary effect in the past, yet I concluded to once more use the strongest stimulus of holding the mirror up to her own soul and endeavor to compel her to think wholesomely for a brief space, and see if, peradventure, it were possible to lift her out of this desperate plight. I cannot say what did it, but something, probably the reawakening in this feeble organism of some conscious willing, once more started the forces on the upward curve. All hope had been abandoned, or nearly so, and yet life slowly waxed and grew. Energy began, and in less time than one could have thought it possible recovery took place. The patient looked on life

quite differently, and thought and acted in a more forceful and rational fashion than for many years. Although apparently in excellent health, months afterwards she was thinner by twenty pounds than when far more ill. My occasional lectures and scoldings and pleadings, however, may be described as serious talks, in part encouragement, in part rebuke, and in part imperative urgings, and these took far better hold upon her consciousness than ever before. Little by little the improvement grew; it would occasionally lapse; and again on the fourth autumn of this long siege the nurse was occasionally withdrawn, and, so far as I can now see, with benefit. She depended upon herself once more, and was delighted and encouraged, and her family believed her nearly well. It must be remembered that "well" for her is a very relative term. It must not be expected that a person so entirely in the depths could ever be again fully restored to original vigor and power. Perhaps had she been more wisely handled from the first her present state might have been even better than it is, but I humbly opine that seldom has a human being been more faithfully, assiduously, and relentlessly pushed and pulled and urged in the way she should go, and, however lacking in wisdom I may have been, she enjoyed the companionship and help of two of the wisest women that it has been my lot to meet, who devoted themselves to her night and day, weeks and months, for this long siege of nearly five years.

As another instance of the overflow of wholesome impulse driving one into a condition of disrepair, I might state the case of a man who came to me after having gone through a series of medical experiments relative to some most distressing symptoms, much like hysterical ones, and yet had a definite cause, upon the removal of which the man got well. The story in brief is this:

This man was a master mechanic, unusually intelligent, who had patented some devices of his own and utilized them in various ways that involved occasional trips to the neighboring cities and quite a little travelling about the country. He was a splendid, vigorous man in early middle life, but who found that every now and again he was more or less suddenly affected by the onset of horrors manifested by alternate heat and cold; one side of his body would break out in a cold sweat, the other would be in a raging heat. Curious pains would occur in his neck and head. Horrible fear of death would

come upon him, and a long train of the usual symptoms of those too frequent states of hysteria.

He consulted a lot of different doctors, some of whom reassured him. Others gravely tried to reason him out of his ideas, and again the more knowing ones would laugh at his fears, bid him regard them as groundless and go on his way rejoicing.

He had his eyes examined; they were found perfect. He had his heart, lungs, and kidneys all explored, and there was nothing amiss. His appetite, digestion, and bowels were to him always a source of profound admiration; they worked perfectly, no fault could be found with them. Nevertheless, for two or three years this thing went on until, although he had no more imagination than another, the symptoms could not be ignored, strive as he would and as he was advised to do.

When at last he fell into my hands he had recently consulted a very eminent authority, who helped him very much by kindly talk and told him it was necessary to have his case thoroughly looked into. Accidentally, circumstances forebade his continuing with this gentleman, and so I took him in hand and began a thorough search of all his organs. When in the course of a very natural routine I began the exploration of his nasopharynx, I found he had subacute catarrh worthy of attention and relief, a probable source of much "reflex irritation," thence proceeding to the ears, about which there had been no fault recognized, nevertheless, there was an obvious cause. Enormous plugs of wax obstructed the canals, the largest and densest I ever saw. These were removed, the nose cleansed and stimulated, and in a little while all the various symptoms disappeared, but returned occasionally, sometimes gravely enough to warrant constant tactful reassurances on my part.

This man gave me some very shrewd suggestions as to men of his type, which he summed up thus: "Doctor, I'm a hog. All my life I wanted to do too much. When six o'clock comes I am not ready to quit work. I would just as willingly go right on and work until daylight, when, of course, I would be done out. I started to smoke and chew, and I simply ate and breathed tobacco; but I had sense enough to know that therein I was a fool, and so I shut right down on both. I started to drink, simply in the way of sociability, and I could drink, and did drink, more than anybody in sight, but this made such a complete hog of me that I knew that would not do, so I quit;

but it is in work that I am the biggest pig. If I get interested in doing anything, I want to do that the whole time, and I want to do it the best of any folk in sight."

The foregoing is really instructive as explaining one type of morbid impulse in a highly intelligent and capable mind. It can easily be seen how readily and swiftly this can be carried beyond the bounds of prudence and made to do those things which such as they are sorry for or which are hurtful to them.

This man also gave me some very amusing accounts of various medical authorities he consulted and their kind of reasoning. Touching one well-known physician in this city whom he consulted, he told me that he was disappointed in the man because he was not big enough to fit his office. He looked around and made the remark, "Here is a man who has got a great many more tools than he knows how to use, so the sooner I get out of this place the safer." Of a number of others he told me that their logic was at fault. He said, "Doctor, they do not know how to reason. If one of those men were to come into my kitchen and saw me sitting there sick, and happened to see a set of harness hanging up on the wall, he would swear point blank that I had eaten the horse."

One of the most interesting cases of persistent disease of the will it has ever been my lot to meet was a self-made man of large intelligence and aptitude, who at the age of thirty-five had built up an enormous business, had great influence in his State, was an influential member of the Legislature, and was doing a useful work in the world and exercising a wholesome influence, and yet to this day that man has overcoming him a curious kind of dread of impending evil which he defies, but which is usually in the nature of some personal calamity. This has gone on for years. He is certainly not worse, and indeed he has now the condition well in hand. It never masters him in an important situation, it apparently does not mar his work, and is simply a source of great distress to himself. His bodily health is magnificent; he is an excellent all round athlete. I have been with him in situations of considerable peril, where strength and prompt intelligence and skill in the use of weapons were demanded, and in none of these was he found wanting. He is guilty of no evil habits whatsoever. He is in many ways a singularly well-balanced man, and yet he tells me that sometimes it requires Herculean effort on his part to go into a hotel dining-room and sit among strangers at

a meal. It requires a larger effort for him often to order and eat a meal and conduct himself like an ordinary citizen, and yet he always fights it out and masters the morbid impulse.

I told him long ago that his condition was like dealing with a fractious horse; that he must always overcome, otherwise the horse would gain the ascendancy. That fact is always perfectly clear to him, and, like the honest gentleman he is, he suffers and strives. Being very fond of horses, it is a source of great distress to find sometimes when driving a pair of vigorous roadsters that this horror gradually creeps over him and almost paralyzes his efforts of control over the horses, and he says that once or twice he thinks he has been in sore peril therefrom. But he continues to drive his horses.

The one fault I can find in his organism is an occasional evidence of dyspepsia, probably brought on by the more or less irregular living entailed upon one who travels about a great deal and lives here and there. We have an occasional talk, and I go gravely into all these symptoms with him and endeavor to explain away all this, yet cannot account for others upon any rational basis. The man has kept the ascendancy over these morbid influences, and they are slowly lessening if not disappearing. Bar some calamity, he will be successful, but the danger lies in some overmastering catastrophe or shock or sorrow which may dethrone the balance of his forces of intelligence.

VARIOUS FORMS OF PARALYSIS AND THEIR LOCALIZATION.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY MEDICAL COLLEGE, NEW YORK.

BY EDWARD D. FISHER, M.D.,

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New York.

GENTLEMEN,—We shall consider at our clinic to-day the various forms of paralysis and their localization. It is not my intention to furnish you a scientific study of paralysis, but simply a classification, illustrating the subject by our cases at the clinic.

Paralyses may be divided into four types or classes: first, cerebral; second, spinal; third, nerve; and fourth, muscular. Paralysis is loss of motor power more or less complete. It may be associated with sensory disturbance, as pain or anæsthesia, or these may be absent. Again, muscle atrophy and changes in the reflexes may occur. It may also be unilateral or bilateral, or uniformly commence in certain groups of muscles. All these differences effect the nature of the paralysis and its lesional site.

The cerebral type is characterized by its being usually unilateral and involving the whole half of the opposite side of the body, including the lower half only of the face. Associated with this there is aphasia and deviation of the tongue to the paralyzed side which aid us in deciding upon the brain as the site of the lesion. The condition of the muscles differs from that of any other form of paralysis, except that affecting the lateral tracts of the spinal cord. But in the cord disease the affection is as uniformly bilateral as in brain lesions it is unilateral. This muscle condition expresses itself by absence of atrophy or wasting, the only exception, and that only a partial one, being cerebral hemiplegia of children.

There is also no electrical change except a slight quantitative one. Any muscle, however, which fails to respond to the faradic current

and shows the reaction of degeneration to the galvanic current must have its cause of disease outside of the brain or motor tracts of the cord. The significance of this is well illustrated in a case of facial peripheral paralysis,—that is, Bell's palsy. The differential diagnosis can always be made between the latter and cerebral facial paralysis, as in Bell's palsy there is failure, complete or partial, to the faradic current and reaction of degeneration, complete or partial, to galvanism. There is also the symptom of which I spoke previously: cerebral lesions involve only the lower part of the face, while nerve lesions, or those affecting the nuclei of the facial nerves, affect the whole half, causing, therefore, inability to wrinkle the forehead on the affected side, and inability to close the eye. This virtually never occurs in cerebral lesions, clinically pointing, therefore, to the facial nerve or its nucleus as the site of the lesion.

The third characteristic of brain palsy is the spasticity or rigidity, with exaggeration of the reflexes. This last condition absolutely shuts out the possibility of infantile spinal paralysis. Contractures of the unparalyzed muscle are indeed present, but there is always in these latter cases an absence of reflexes and spasticity.

The usual site of cerebral lesions is in the internal capsule or its neighborhood; that is, in perhaps eighty per cent. of the cases without preference for either side, whether due to hemorrhage, thrombosis, or embolism; and I say this even in regard to embolism which is generally supposed to seek the left side of the brain.

The effects on the brain structure are the same in all three lesions,—i.e., more or less destruction of the brain substance at the seat of the lesion, and secondary descending degeneration in the motor or lateral tract of the spinal cord; in other words, secondary hemi-lateral sclerosis.

To diagnosticate from the symptoms in cerebral paralysis just what part of the motor tract is involved is impossible unless a cranial nerve is also affected, as, for example, a lesion in the *crura cerebri* with a third nerve paralysis on the side opposite the hemiplegia, or a lesion of the pons showing facial paralysis on the side of the lesion and hemiplegia on the opposite side.

This was clinically well demonstrated in a patient in Bellevue Hospital who came before you some time since. The symptoms were paralysis of the right side and some motor aphasia, rigidity, and exaggeration of the deep reflexes. As the history was specific, and the

onset had been gradual, the diagnosis was cerebral thrombosis involving the left internal capsule. The chances of the diagnosis being correct were more than seventy-five out of a hundred. Three months later a second attack occurred involving the opposite side. The second lesion might have involved the opposite internal capsule. A double cerebral lesion is, however, rare, and a diagnosis of thrombosis of the basilar artery was therefore made. The post-mortem examination showed the latter diagnosis to be correct. From the symptoms a more exact diagnosis was impossible.

The second type, or spinal paralysis, with the exception of lateral tract disease, which is really of the cerebral type, characterizes itself by wasting and atrophy of the muscles, either accompanying or following the paralysis, and, except in myelitis, absence of sensory disturbance; and even in the latter these are marked by loss of sensation rather than by disturbance of a painful character.

The electrical reactions associated with atrophy are always well marked when the disease is located in the anterior horn of the cord and is acute in character, as is seen in poliomyelitis anterior acuta, but in chronic degenerations, such as progressive muscular atrophy, the changes produced by the current are less marked, though present. We have in all these paralyzes flaccidity instead of rigidity, and loss or diminution of the reflexes. With the exception of poliomyelitis, also, these diseases are bilateral. The electrical reaction is the following: loss to the faradic current and reaction of degeneration to galvanism. It is especially this which differentiates inflammatory troubles of the cord, as myelitis or poliomyelitis, from progressive muscular atrophy, as well as from the hereditary forms of atrophy affecting special groups of muscles, as in pseudo-hypertrophic paralysis or the juvenile type of muscular atrophy. This latter, as we have said, gives only slight reductions to both currents.

It is well illustrated by two cases recently at our clinic.

CASE I.—Large and well developed man, thirty-one years of age, a laborer by occupation. He gave a history of syphilis, but not of alcoholism. The present illness began about eight years ago. He first noticed a weakness of the hands and wasting of the interossei and lumbricales muscles; never at any time any pain or sensory disturbance. The condition spread, involving the knee, so that little power remains in flexion and extension. Later, the shoulders and arms were involved and the muscles of the tongue. The diagnosis

was progressive muscular atrophy,—that is, a slow degenerative process involving the anterior horn of the gray matter in the cord. The electrical reaction was present and only quantitatively affected.

CASE II.—B., forty years of age; Italian; a stone-cutter by occupation. His history was negative. He said he first noticed a weakness in the shoulders last April, so that he was unable to raise his arms; later, it involved the hands. The muscles were much atrophied in both upper extremities; the thenar and hypothenar group of muscles were also atrophied, looking like progressive muscular atrophy. Some weakness also in the lower extremities was present but not marked. At the time I first saw him, in October, 1893, this latter symptom had disappeared. The electrical reaction showed absolute loss of faradic response of the muscles of the upper extremities, with reaction of degeneration. This and the rather rapid onset of the disease—in the course of a month—differentiated it from progressive muscular atrophy, although that diagnosis had been made previously. I classed it, therefore, as a poliomyelitis involving the anterior horns of the cord in the cervical region. At the present time, under electricity and strychnine, a marked improvement in the shoulders and arms, and less, although perceptible, in the hands, makes my diagnosis positive.

(The patient has later continued to show marked improvement, so that now he is able to raise his arms over his head, and complains only of some weakness in the hands.)

The appearance of a patient suffering from paralysis of both upper and lower extremities, with wasting, absolutely helpless to move perhaps a finger or toe, is very suggestive of myelitis, and was until recently always considered as such. A sensory disturbance would, however, differentiate it from myelitis. When we find excessive pain along the course of the nerve, and in the substance of the muscles on firmly grasping them, the cause of the disease must lie in an inflammatory condition of the peripheral nerves, and is therefore a multiple neuritis, and in the majority of cases is of alcoholic origin. A case of that nature I saw this afternoon with a physician in consultation, and made a diagnosis on the grounds above given.

We come now to a consideration of our third type of paralysis,—that due to disease of the nerves, traumatic or toxic. The former are usually local, as seen in paralysis of the musculo-spiral, with its

resultant wrist-drop, occurring so often from sleeping on the arm while intoxicated; or in the so-called "crutch-paralysis," or those following dislocations, fractures, etc. Here, according to the severity of the lesion, we find paralysis and atrophy of precisely the same character as from inflammatory conditions affecting the anterior horn of the spinal cord, and for the same reason,—the influence of the cells in the horn has been cut off from the muscle. Loss of faradic response and the reaction of degeneration indicate the severity of the lesion, and their gradual return to normal as positively indicates recovery of the nerve. Here we are guided by a history of injury in our diagnosis, and also by the local character of the paralysis, and usually by some degree of anæsthesia and pain along the distribution of the nerve.

Most of the toxic forms of neuritis, as in alcohol, arsenic, lead, etc., are bilateral. Syphilis, while often multiple, is irregular in its distribution, electing different nerves, as those of the ocular muscles; next perhaps the arm, and then the lower extremity of the opposite side. Lead usually involves the extensors of both forearms and the small muscles of the hand. Here there is not, as a rule, much pain; still, we can often elicit it on compression; the muscles are much atrophied; the electrical reaction shows loss to faradism, and often only a partial reaction of degeneration. In these cases, the nerves do not show complete destruction of the axis cylinder. Alcohol almost uniformly involves the lower extremities first, giving a double foot-drop, and later the upper extremities, giving double wrist-drop. Pressure over the nerves and muscles causes exquisite pain; mere movement does not, differentiating it, therefore, from spinal meningitis, which does, but in which nerve pressure does not cause pain. The loss of reflexes and electrical loss to faradism and reaction of degeneration, so frequently present to galvanism, establish the diagnosis.

I would draw attention here to the mental symptoms in alcoholic cases. We have a dementia, acute in character, in which the patient loses all idea of time and place. He cannot tell when the illness began, or how he got to the place he is in, or how long he has been there. There may also be some delirium with hallucinations. This occurs often in cases where no symptoms of delirium are present, and probably depends on the affection of the cortex cells of the brain, and the association fibres, which may lead to their atrophy; at least that is

what a microscopical examination showed in a case which I have reported elsewhere. You will remember a patient corresponding to this description in whom a fair recovery had taken place, but who was unable to give any account of how she entered the hospital, or of the year that had elapsed since her admission. In many of these cases also, where muscular power has been restored, we still find evidence of a previous nerve lesion in the continuance of the pain on pressure along the nerve, and also in the absence of reflexes. This subacute or chronic condition may therefore, without an accurate knowledge of the previous history, lead to an error in diagnosis; many such cases have been taken for locomotor ataxia, the loss of reflexes and the somewhat staggering gait bearing a close resemblance to this disease.

I must now hasten to simply mention the fourth division of paralyses, or those due to changes in the muscles themselves, and distinctly separate from those we have just been considering. Under this head comes pseudo-hypertrophic paralysis, a disease peculiar to children, in which, along with atrophy of the muscular fibres, we find fatty infiltration between the fibres. The calf muscles are enormously enlarged in the early stage, but are very weak. We find also that the spinal muscles are much weakened, causing lordosis, a prominence of the abdomen resembling that seen in progressive muscular atrophy.

Similar affections involving, however, always certain other groups of muscles, and therefore receiving different names, are seen in more advanced life,—the so-called juvenile or Erb's type, where the scapulo-humeral group is the first affected, the forearm and hand escaping until often very late in the disease, and in some cases the thigh being much atrophied while the calf muscles remain strong. This is usually bilateral and is hereditary, commencing usually about the age of eight to twelve years. The two brothers which we have shown are of that type. We have here excessive wasting of the scapulo-humeral group of muscles and also of the thigh. They are the only members of the family so affected. Another case gave no hereditary history, but the distribution of the paralysis was precisely the same. We have also the so-called peroneal type, the disease commencing in that group of muscles, and more rarely the face shows like signs of muscular atrophy. This last form is usually associated with the scapulo-humeral wasting.

The cause of these diseases lies probably in some congenital developmental defect, and represents therefore a primary tendency to degeneration. The nerve terminations in the muscles show degeneration, but the peripheral nerve and cord reveal no change. The electrical reaction is in my examination only quantitatively reduced.

In closing our lecture, I would allude to wasting and paralysis associated with joint-affections. All diseases of the joints have a tendency to involve the muscles. In acute inflammatory conditions this affection is slight, and of short duration, and in tubercular joints it may be very marked. In rheumatoid arthritis, where we have usually a bilateral joint-affection with a permanent enlargement of the bones, especially of their ends, the muscles may become so atrophied that the patient resembles a living skeleton. Many such cases fill our museums. The cause is probably a neuritis involving the terminal nerves as they enter the muscles. Electrical response remains in these cases as long as the muscular fibres exist. This classification seems to be founded on pathological and clinical grounds.

Surgery.

OPERATION FOR FISTULA IN ANO (TUBERCULOUS).

CLINICAL LECTURE DELIVERED AT THE KENTUCKY SCHOOL OF MEDICINE HOSPITAL.

BY JOSEPH M. MATHEWS, M.D.,

Professor of Surgery and Clinical Lecturer on Diseases of the Rectum in the Kentucky School of Medicine; Rectologist to the Kentucky School of Medicine Hospital and the Louisville City Hospital, etc., Louisville, Kentucky.

GENTLEMEN,—We have more material in our clinic this morning than we can possibly utilize. They are all practical cases in rectal surgery, and I desire that you see as many of these operations as possible while you are here.

Yesterday I lectured by invitation at the Cleveland (Ohio) Medical College, having been furnished a clinic. A patient was brought to me as one of fistula in ano, and I was asked to talk about the case and to operate. I tried to demonstrate to the class what they could discover by ocular inspection; what would be a plain case of fistula because they could see the external opening; then went on to discuss, as you have often heard me do, that you cannot tell exactly by the external opening the amount of trouble existing, and insisted that any one should be guarded in expressing an opinion in any case of fistula in ano, even where the external opening was plainly visible, without inserting the finger into the rectum to determine if there was a complication. After talking about ten minutes, I anointed my finger and inserted it into the rectum of the patient and found a close stricture, beginning about one and a half inches above the sphincter muscle, blocking up the rectum to the sigmoid flexure, beautifully demonstrating to the class this fact: that here was a man who has gone through an examination perhaps in the private offices of many physicians and was told he had a small fistula, only a slight affection of the rectum, and no operation was

performed upon him. He comes to the clinic, and we find that he not only has a fistula, but the rectal complication is so extensive that no operation is justifiable for its relief, and that an operation for the fistula under this condition of affairs is also unjustifiable. Consequently no operation was performed upon the patient, but it served the purpose of demonstrating to the class how easy it is to make mistakes.

CASE I.—I will ask Dr. Green to read the history of the first patient to be operated upon this morning.

J. M. R.; patient is a man forty-four years of age, a farmer by occupation. Family and personal history good. The trouble in his rectum began eight years ago, when a swelling appeared at the anal orifice. After a few days this ruptured and disappeared. From time to time since then the swelling has appeared, but always accompanied by pain, each time rupturing spontaneously, and the pain coincidentally disappearing. Last July he consulted his physician, who told him he had an abscess, which he incised, and evacuated a tablespoonful of pus. Symptoms of septicæmia came on, and he was not able to be out of bed for at least a month. Since that time there have been two abscesses, which emptied themselves after a day or two without any further discomfort.

Present History.—He has no pain. There is a discharge of a yellowish fluid which constantly comes away from the parts. This has a disagreeable odor and irritates the skin in the neighborhood of the points of discharge. It will amount usually to about a teaspoonful in a day. Bowels move once daily, but there is generally more or less straining accompanying evacuation. Now and then there is a streak of pus over the motion, but it is generally normal in consistency and formation.

The genito-urinary organs are in good condition.

There are one or two points to which I desire to call your attention in this case. Here is a condition which Dr. Green diagnosticates as that of fistula in ano, but he reports that during the existence of an abscess, or following it, this man had sepsis; he must have had quite a degree of sepsis to confine him to bed for four weeks. It should impress upon us this point: whenever you meet with an abscess, I do not care where it is located, but more especially for reasons you will understand, when you meet with an abscess around the rectum, open it at once. An abscess is a cavity filled with pus,

containing the germs of sepsis, which if absorbed into the surrounding structures septicaemia may follow, and the patient die from sepsis from a simple abscess. But the doctor states that in this case the abscess broke of itself. At this point let me say to you never allow an abscess to break itself; at least anticipate the surgical dangers and open it. Now, in opening an abscess one thing should be paramount in consideration above all others, and that is to have free drainage from the abscess-cavity; do not, then, take a small knife and stick it down into the abscess and regard that as opening it; do not follow the suggestion of the old woman and prick it with a pin and have the pus exuding and the pain continuing, and think that you have properly opened the abscess; but open it freely, deep and wide enough to drain, because of the fact that you want to get rid of the material containing the germs which will produce sepsis first; secondly, that you will prevent the ravages of this abscess and the destruction of tissue, etc., around the local situation. Often has it been witnessed by myself that patients have an extensive fistulous condition around the rectum simply because the physician who was called in the case did not treat the original abscess properly. You must remember that all fistulae begin with an abscess; however small, however free from pain, inflammation, etc., still it is an abscess, and when the patient gives a history of symptoms of disturbance around the rectum, search for this abscess, and finding it, open it freely. I am persuaded that if abscesses around the rectum were treated in a surgical way there would be comparatively few fistulae that would follow. It may prevent your getting a case of fistula to treat, but you will have the satisfaction of knowing, for your own conscience' sake at least, that you have prevented a very ugly and sometimes dangerous disease.

Now, this patient has a fistula in ano; the next question is, by what was it caused? You should inquire after the habits of the patient; you should as far as possible ascertain if there is any special diathesis, such as syphilitic, tuberculous, or any other, even if you can come to the conclusion that there is none such; then examine the rectum with your finger thoroughly to find out whether you may not have a more serious affection than fistula, which may be cancerous, ulceration, etc. Every case of fistula, gentlemen, is an individual case; you cannot give any special directions about operating for the trouble, because you are to determine the character of

the operation when you examine your patient. If this man has any complication that can be attended to at the same time that we operate for his fistula, of course we will look after the complication. If we should have so serious a complication as cancer, then of course we would have to consider whether or not it would be justifiable to operate for the cancer.

In an external examination we see what appears to be a long cicatrix; whether this man has ever been operated upon before I do not know. I do not like the appearance of the external condition; it seems to be an infiltration of the tissues, a flabby condition, as far as the tissues themselves are concerned, along the line of either the cicatrix or of the disease proper; this man may possess some special diathesis, which seems quite probable from the appearance of the external condition. There is no pain, which is also a point of importance in the diagnosis. Tuberculous patients who suffer from this condition of fistula very rarely have any pain; you will also have noticed in operations done upon tuberculous patients that hemorrhage is very slight, the tissues very pale, the hair around the anus very silky in appearance,—all these things point to a special diathesis; but I will insert my finger into the rectum after he is under the influence of chloroform to determine the condition of the sphincter muscle, and the rectum itself. Having done this, I find no stricture, when I press above pus spurts out at the opening below, but I do find a softened or pulpy condition running along the main sinus up above the sphincter muscle to the extent of three to three and a half inches, showing a very extensive inflammatory condition. In this case the sphincter muscle of necessity, in order to cure this man of his fistula, must be thoroughly divided, yet it is in rather a delicate condition. This is the character of fistula that I have often described to you as being progressive. There is a great discharge of pus. We need not be particular about trying to follow any special sinus, because in making our cuts we will find many of them. You will observe that this condition seems to be external, not going back into the rectum; it opens in the true skin above, but finally you will notice that beyond a channel burrows deeper and goes into the rectum. Here we find the first cavity resulting from this condition of affairs. We will enter the rectum with this probe and bring it out, then divide the tissues upon it. Now, as you observe, we have quite a lengthy wound; at the bottom

of this wound there is abundant indurated tissue, so instead of following the channel we will divide it with the knife until we get to healthy tissues. I can run my finger for some distance down into the tissues. We now have a very free open wound, but we will search for other sinuses. We find one, and I will break it through; we will only go as deeply into the tissues as we think absolutely necessary. Running up the perineum you will notice another channel, consequently we will divide that. We will do a little curetting, first trimming off the edges of the sinuses, then search for additional channels. If we were to leave these edges in their flabby condition the wound would never heal. It cuts like tuberculous tissue; it is very pale and flabby. This wound of course must heal by second intention; we cannot approximate the edges from the fact that we trim away so much tissue. Now having a large open wound, we will search it to see what the real condition of the bottom is. We find a channel a little deeper in the tissues, which we must also lay open. Consequently more trimming is necessitated.

Now with my finger inserted into the rectum I will ascertain if I have reached the upper border, or the internal opening of this fistula. I am satisfied that I have. I find two additional sinuses, which I will break down with a grooved director. The bottom of this tract I will curette, from the fact that it has a glistening appearance, and granulation would not set up in it without curettage. With abundant curetting we will compel it to do so. This is the membrane that was formerly called pyogenic membrane. I think I will not only curette but also divide it so as to be certain that I will get granulation-tissue to start up. At the other extremity of the wound we find a sinus extending a little farther; we will cut through and scarify it. We will trim the edges below; although they are not pouting they have been injured. You observe how little blood this man loses, although we have a large wound, which is certainly characteristic of a condition that I have described.

You observe that the operation is completed; we have a free wound that must heal by granulation, and it will be dressed looking to that culmination. It is just as important to properly dress a wound of this kind as it is to make it. I have often said to you that I feel when I get through that I wish I had done a little more cutting; I mean in regard to trimming the edges of the wound, etc.

The case before us beautifully illustrates the necessity of an

operation for fistula. Suppose this man had gone another six months without operation; you saw the amount of pus that was being discharged; if the condition had been allowed to progress, pus would have forced its way around to the other buttock; it had already gone one and a half inches up the perineum; it might find a deeper channel, going, as I have often said to you, down upon the thigh. Consequently without operative interference these people become physical wrecks, and it is your duty as surgeons to operate early. Upon this one point I want to again insist, at the risk of reiteration, that you determine the question whether the patient, who is suffering from a fistula in ano, should have an immediate operation or not; but you say this man should have an immediate operation; if so, why? That is the reason I have made a distinction between a *progressive* and a *non-progressive* fistula. You can then determine whether an operation is necessary immediately by the amount of pus that will exude or discharge. If upon examination you are satisfied, if, for instance, by pressure on the buttock pus exudes, you know it has burrowed; you know outside of this that there is an abscess, or at least you know that pus contained in the abscesses may produce a fatal sepsis; you know that when pus discharges from an external opening that it may come from deep down in the buttock. Consequently do not delay your operation a single day. You can understand why it is that the laity from time immemorial has had the impression that fistula was a very serious disease. In making an examination per rectum of your patients you will be surprised how often the patient himself or a friend will ask, "Doctor, is it a fistula?" Now that means to them that if it is a fistula it is a very serious disease, but they are not basing their ideas of its significance upon the same points that you are. I will tell you what they are thinking about: they have been taught to believe that fistula is intimately connected with phthisis, or consumption. They are thinking that if the patient has fistula, why, he must of necessity have consumption, perhaps afterwards, or perhaps that phthisis already exists; but they go farther than this in their own minds and say, if the patient has a fistula and you have so diagnosed it to them, and you suggest an operation, they will say, "Why, he will have consumption if you operate on him." Consequently there is more for you to overcome, more obstacles to fight in making a diagnosis of fistula, than any disease I can think of, because the prejudice of

the family is often brought about by being taught by the physician himself. If any patient requires a surgical operation for fistula, the majority of cases having phthisis or who are predisposed to phthisis are the ones that should be operated upon. For years the books, including works on diseases of the rectum, have been very chary about saying this, indeed, they do not now so proclaim. They believe in the majority of instances you had better leave these phthisical patients alone if they have fistulæ. Allingham in his recent work says, "If the fistula gives more distress to the patient than his lung is giving, operate on the patient especially to relieve his mind." Now, that is not the premise for you to assume; it is, if this man has a tuberculous condition of his rectum he is in danger of general tuberculosis if you do not get rid of these little foci in the buttocks or around the neighborhood of the rectum. In other words, you will save many a life if you can recognize by the different methods of recognition tuberculous tissue that is local. Tuberculous tissue may be anywhere. I meet with it around the rectum in my specialty; you may meet with it in a general surgical way, and if you do you are very fortunate, because you can do some surgery upon the tuberculous patient and perhaps prolong or save life. I remember once to have been in the clinic of Senn, of Chicago, and he had the whole amphitheatre filled with patients to demonstrate to the class that tuberculosis could affect any tissue of the body. And he began by demonstrating the first case of tuberculosis of the scalp, and one after another to demonstrate that you may have local tuberculosis in any portion of the body. Now, I say you will rescue a man's life just as thoroughly as if you were to jump into the river and save him from drowning if you can see him at the proper time and do a thoroughly radical operation as far as the tuberculous deposit is concerned. What do we call a thoroughly radical operation? What would we call a radical operation for cancer? It would be cutting wide of the mark and removing all cancerous tissue. So it is with tuberculosis, you must remove all infected tissue. The question comes up, How can that best be done? I often read of operations of this nature done by means of the curette, curetting the surface. Now, gentlemen, the curette is a most excellent little instrument; it aids us very materially in the treatment of wounds, there is no question about that; but you scarcely know whether you can curette all of this infected tissue from a surface like

this or not; consequently the knife, scissors, and other cutting instruments are much better, and of course you are to drain here in order to protect your patient. The same rule holds good as in operating for cancer; it may be that you cannot excise all infected tissue, but I would much rather leave some tuberculous tissue than to leave cancerous tissue. I believe that if you do an operation which is nearly complete in tuberculous tissue, that by the aid of climate, by the aid of proper food, by the aid of constructive medicines, etc., that you can prolong the patient's life and bring him out of the condition of tuberculosis, but if you leave cancerous tissue, if adjacent organs have been infected, if the tissues have become infiltrated and you do not remove them, why, you have done an operation that is *nil* in its effect. Consequently I believe that you do not have to be so very particular in operating upon a tuberculous patient as you would in operating upon a cancerous patient.

If a patient is brought to you with a fistula, if you believe there is a tuberculous deposit in the rectum or about it, I say operate, operate at once, that you may give him the benefit at least of removing tissues through which the infection might become general in its nature. But we will go a little farther. Suppose a patient comes to you and you decide that he has phthisis, his lungs are affected, and in conjunction he has a fistula in ano, shall you operate for the fistula or not? If the patient already has consumption, one or both lungs involved, and also presents a fistula in ano, shall you operate? That is a question that has been mooted for many years. I want you now as sensible men, and it is a good study for you, to take up the reasons that have been offered against operations upon phthisical patients one by one and analyze them, and see whether they are logical from a surgical, or bacteriological, or histological aspect. I do not believe they are. I have operated upon many patients that had consumption for fistula in ano, and have never regretted it. I have seen patients die of consumption after I had operated for fistula in ano and getting a perfect result, but my conscience has never hurt me that I did the patient an injury or that I hastened the disease, but I believe to the contrary that I prolonged life and eased the patient. For instance, a patient is brought to you who has phthisis, but who also has a fistula. Much depends upon your examination of the fistula to know whether you should operate or not. Suppose upon examination you find a characteristic opening to the fistula. I

will tell you what I mean; it is not a little channel or sinus, but it is a large flabby opening, and when you put your finger—ordinarily we examine the fistula with a probe—when the finger can be admitted, you will find it will sweep around under the true skin; you notice I say under the *true skin*, ordinarily we would say deep under the tissues; but in a tuberculous subject it is usually superficial as far as the disease manifests itself by examination; sweep your finger around under the true skin, which you will find can be done to the extent of two or three inches; the anus is also involved in this tuberculous ulceration. Now it is a fact, as Dr. Green read in his report of this case, that the patient suffers no pain; a tuberculous patient will suffer but little local pain, except perhaps that this inflammatory opening is just at the anus, or the ulceration has destroyed the tissue just at the anal orifice. Why should you not lay open the tissues, superficially at least, and trim off the edges to make a smooth surface? Even if you do not excise all the infected tissue, and that may be out of the question when the patient has general tuberculosis, you can empty all the pus-cavities, getting rid of a large quantity of pus, which is certainly a dangerous element even under this condition of affairs. If the patient has had pain, you also get rid of that, and as Allingham has said, if the condition around the rectum is giving the patient more mental uneasiness than the phthisis, then operate upon the fistula. It is a difficult matter to persuade any person that he or she has phthisis. I have seen men and women going around with simply half of one lung, expectorating morning and night, sweating themselves to death, emaciated nearly to a skeleton, who would smilingly say to you, "Doctor, I am getting well." The patient may not believe that she has consumption, but she realizes that she has this ugly condition around the rectum, and she wants to get rid of it. There is no reason on earth why you should not operate upon such a patient. I have made it a rule for ten years to operate upon this unfortunate class of patients.

As I have already indicated, in the practice of medicine you will have a great many obstacles to overcome. Many people will say to you that you should not operate upon such a case as I have just related, because the patient will die of consumption if you do, or that he already has consumption and will die if you do operate. Say you operate, you put the patient at perfect ease mentally and physi-

cally; the wound heals, and the patient is discharged cured of a fistula. Perhaps at the end of the year, it may be sooner, he dies of consumption, which he had at the time you operated. There are people who will be ready to exclaim, "I told you so; if you had not operated upon the patient he would have been living yet; you gave him consumption," etc. This has been said of me; I have heard it from half a dozen families, but I am willing to stand the slur, knowing that I gave the patient ease and rest physically and mentally if I did not actually prolong his life. My operation was not for the purpose of curing him of general phthisis, and because forsooth the patient dies in a year or five years afterwards of consumption with which she suffered at the time of the operation, how is it possible that the wound around the anus had anything to do with her death?

Without going into any protracted argument I want to say to you in regard to these unfortunate patients, because I believe there is no more unfortunate class than those who have consumption, you should give them all the encouragement you can. Make a very thorough examination of the entire general system as well as locally, and if you come to the conclusion that you as a surgeon can be of any aid to the unfortunate patient, operate regardless of what people will say. I do not suppose there is a physician living but what has sometimes, after his patient is dead, wondered if he could not have done more for the patient during life; that he will at least try to do more for his next patient, etc. You certainly have no intent to kill anybody, and after doing all you can for a patient, if he should unfortunately die, you are not a murderer, therefore your conscience is at rest.

SOME REMARKS ON THE DIAGNOSIS OF SYPHILIS.

CLINICAL LECTURE DELIVERED AT THE MIDDLESEX HOSPITAL.

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GENTLEMEN,—I wish to-day to direct your attention to two cases at present lying in Hawkins's Ward, as they are characteristic of a class of diseases so frequently met with in practice, perhaps more in the male than in the female sex, and, since they are not, as a rule, admitted into the general wards of the hospital, students have not many opportunities of seeing and having them demonstrated to them. Syphilis, as it frequently presents itself to us first, is in the shape of a rash, and this rash has varying characteristics. It is sometimes a simple roseola, more often a scaly eruption, sometimes papular and occasionally pustular, hence a careless observer may easily mistake it for some other cutaneous affection. Indeed, it is often only by the concomitant symptoms, and the history, which is not always reliable, so more stress must be laid on the symptoms, that you are able to arrive at a correct diagnosis. I may further remark that it sometimes so resembles some of the acute specific diseases that it has even been mistaken for measles and for scarlet fever. These two patients, happening to be admitted within a few days of each other, both complaining of an eruption on the skin, one adding that she had a cough and sore throat as well, and the other that she had some sores about the genitals, give me a good opportunity of making some practical remarks on the subject which I hope may prove useful to you. Let me first give you a brief *résumé* of the cases.

R. C., aged twenty, a French woman, professes to have been married three years, but separated from her husband for the last seven months. She admits having had sexual intercourse within the last three months, but only once. She has had one child, born in May of the present year, which died when about three months old,

of what she is unable to tell us. She has always enjoyed good health until last February, when, she says, her husband infected her with gonorrhœa just before he left her. Of this she was effectually cured, and had no further trouble until the middle of August, when she observed a sore on her vulva, and after that had existed a fortnight a rash appeared, which has been gradually extending to different parts of her body, hence her application for admission here. Her state on October 2 is described as follows: A well-nourished, healthy-looking girl; over her body is a widely distributed but scanty eruption, consisting of small patches varying in size from a split pea to a sixpence, and having different characteristics. Some are red patches, some have a brownish tint, and some are merely brown stains; some are covered by thin scales, and some are papules; the eruption is most marked over the front of the chest; there are a few lesions at the back of the neck, on the flexor surfaces of the arms, and symmetrically in both palms, in the axilla, and on the calves; the elbows, knees, abdomen, and back are quite free; there is no itching. The hair is coming out rapidly, and this is especially noticeable in the eyelashes and eyebrows. The mucous membrane of the mouth presents nothing abnormal, the pharynx is injected, and milky-white patches, the size of a split pea, are seen on both tonsils; on the glosso-pharyngeus muscle on the left side is a small, sharply cut, superficial ulcer. Enlarged lymphatic glands, varying in size from a pea to a cherry-stone, may be felt in the posterior triangles of the neck, over both mastoids, in the *axilla*, and in the groins; they are very hard and movable. The crest of both tibiae is distinctly irregular. There is no vaginal discharge, and the genitals look perfectly healthy, with the exception of a raised flattened condyloma about the size of the pituitary body at the posterior part of the vulva.

The other case is that of J. P., aged twenty-four, single, by occupation a domestic servant; always enjoyed good health till now, and has never been confined to her bed, except with scarlatina when she was eighteen years of age. Her present attack commenced in June of the present year,—that is, about four months ago, when she noticed a number of red spots about her chest, and that her hair was falling off; as it hurt her to swallow, and her voice became husky, she looked into her own throat and observed a number of patches of white at the back, but she did nothing for it, and although she had

a good deal of irritation about her genitals and found that she was swollen, and that the fleshy lumps discharging offensive matter were increasing in size there, she continued her work and sought no medical advice until now. Her state on admission on October 7 is as follows: A fairly nourished, but anæmic and careworn person; over the back and chest is a brownish-red mottling of the skin; this extends over the loins and buttocks, where in addition there are desquamating patches the size of split peas, and here and there on the abdomen and limbs is a pustular rash. On looking into the throat both tonsils are seen to be enlarged and covered with bluish-white, raised mucous patches, many of which are superficially ulcerated; similar patches are seen on the mucous membrane of the cheeks, and the whole of the mucous membrane of the throat is much injected; the tongue looks healthy. Indurated shotty glands are felt in both groins, and some also behind the sterno-mastoid, but glandular enlargement is not observable elsewhere. On passing the finger down the front of the tibiæ, they are both felt to be irregular, and, on being questioned, the patient says that lately she has had "rheumatic pains" in her legs, especially at night. About the arms and labiæ, and especially in the fold between the left labium and the thigh, there is a most extensive area of condylomata; they consist of flattened papillary elevations which have run into one another, to form a brownish, raised, wart-like surface; the epithelium is sodden, and discharges a thin puriform liquid; there are no actual sores to be seen. It may also be mentioned that the uterus is much enlarged, the breasts have the appearance they present during gestation, and there has been amenorrhœa since May. After some pressing, the patient admits that she exposed herself to infection during that month, but at no other time has she ever had sexual intercourse.

The above is all the information we are able to get from the patients, and from our own observation, putting the two together, are we in a position to make a diagnosis? If we have to go by the history, I should say we are not. If, on the other hand, we go by appearances and general symptoms, I should say we are, and I have no hesitation in pronouncing both to be syphilis, although, if the history be accurate, the present views regarding the incubation period and early course of this disease will require to be modified. In no case, I think, should too much stress be laid on the patient's history; it is very useful as far as it goes, but frequently a patient

is unable to give a sufficiently accurate account of himself even when he is cross-examined, and is himself most anxious to give all assistance in his power; and somehow or other we find patients suffering from any form of venereal disease among the most difficult to get information from; they often deliberately conceal facts and make wilful misstatements, and sometimes the latter are too ridiculous to have a semblance of truth; but I suppose they don't see it in that light.

Now, let me briefly go over the normal course of syphilis. There is first a period of incubation, and this is usually from three to four weeks after the date of infection; the shortest time that has been recorded is ten days, and the longest seven weeks; there may or may not be an abrasion, a vesicle, or even a pustule observed at the time, or within a day or two of the date of infection, but if there be, it is frequently regarded as a very trivial matter, gets well in a day or two, and the patient thinks no more about it until further developments occur in the shape of the chancre, of which it is not uncommon for little or no notice to be taken, particularly in women, where it is usually more or less concealed by the folds of the labiæ, and in some cases is within the vagina, or even on the os uteri. In these cases it is not until the rash appears—and the two before us are examples of this—that medical advice is sought. At any rate, after the lapse of the incubation period the local sore or the chancre develops; it varies somewhat in character, but the typical syphilitic or, as it is sometimes called, Hunterian chancre presents the following characteristics: it is single, circular, has sharply cut, undermined edges, an ashy-gray slough occupies the base, and a slight serous discharge oozes from it; it is painless and indurated, this last being its great characteristic; if the base of the sore is seized between the finger and thumb, the sensation of having hold of a piece of cartilage is experienced, and wherever this condition is present, even though the sore has none of the other characteristics, the probability is the patient is infected with syphilis. The chancre, if left to itself, will often, particularly in otherwise healthy individuals, disappear in time, but it will most assuredly be followed by secondaries. Accompanying the chancre will always be found, if looked for,—not necessarily otherwise, as they are not painful, and the patient will not be likely to call attention to them,—a characteristic enlargement of the lymphatic glands; they feel like large shot or almonds under

the skin, hence the term *shotty glands* or *amygdaloid enlargement*; they are best felt in the groins and at the back of the neck, but may also be found wherever lymphatic glands are situated, and they are very characteristic; they enlarge slowly, do not run one into the other, so as to form hard masses as tubercular glands do, and they have no tendency to suppurate; if they inflame, they form the so-called *indolent* or *syphilitic bubo*, the secretion from which, by the bye, a *sero-purulent fluid*, is, if brought in contact with a crack or sore on a healthy individual, quite capable of inoculating him; hence surgeons and students should be extremely careful, when dealing with these *syphilitic buboes*, that they have no cracks or other sores on their fingers. This condition will ameliorate, if left to itself, though efficient treatment will cause it to go much more rapidly; but whether healed or not, in due time the secondary, or, as they are sometimes, but badly, called, *constitutional* (because the disease is constitutional in the primary stage) symptoms appear, the length of time varies, and the more active the treatment, as a rule, the longer they keep away, and the less severe they are when they show themselves. The time that elapses between the appearance of the chancre and these secondaries is often called the period of second incubation, and usually lasts about six weeks; it may appear as early as a month, or as late as three months, and during this period the patient's general health is invariably affected; *anæmia* is a leading symptom, and this is accompanied by loss of flesh, *neuralgic pains*, and a general feeling of being out of sorts, but the patient is rarely prevented from following his usual avocation. The secondary affections are the skin eruption, ulceration of throat, loss of hair, *peri-ostitis*, *iritis*, and *condylomata*.

With regard to the skin eruptions, is there anything about them specially characteristic of syphilis in the early second stage? I think not. Almost any variety of eruption may be seen, and this is true of the later secondary stages, but here there is one characteristic rash, and that is *rupia*, a pustular rash in which the scabs get raised up in a conical form in the shape of miniature sugar-loaves. These two cases we are considering present a variety, but not the last named; that is rarely seen now; it only occurs in those who are broken down in health from want and exposure, and we only average about one a year in *Hawkins's Ward*. The most common is the simple *roseola*, the next a scaly eruption, the next a papular, then a pustular, and

the least common a vesicular or bullous, and the ordinary names applied to these diseases are used to express them, prefixing the word syphilitic,—*S. roseola*, *S. psoriasis*, *S. lichen*, *S. acne* or *ecthyma*, *S. eczema*, and *S. pemphigus*. We have examples of the first four in the cases we are considering. If there is not a special variety, are there any special features about these syphilitic eruptions? There are, as follows: the fact of their being mixed; that they are more or less symmetrical; that they do not itch, indeed, except for seeing them, the patient would not know he had them; that the chest, abdomen, front of arms and thighs, and forehead are their favorite seats; and that as they die away they leave a typical discoloration of the skin, having the appearance of a piece of raw ham. It is a mistake to think that a deeply pigmented scar is necessarily syphilitic; it may be, but so may any scar the result of long-continued ulceration, and you will see some syphilitic scars quite free from pigmentation. I repeat, the characteristic stain is the light brown, which gradually dies away, and a person who has had a secondary syphilitic rash will eventually have a perfectly clear skin again.

Now, with regard to the throat, where I think we may say there is a specially characteristic condition; at first there is deep injection, as if the same eruption that appears on the skin is on the throat, and this redness of the pharynx and fauces lasts for a long time; but there is soon ulceration, which spreads superficially, but not deeply; the deep ulcers occur later, apparently being breaking-down gummata, and this gives the surface of the tonsils a whitish appearance; further, there is no pain and the syphilitic throat is not a sore throat, hence do not be satisfied with asking if the patient has a sore throat, but always look.

Loss of hair is the next symptom I mentioned, and this occurs all over the body, and is probably due to the skin affection interfering with the nutrition of the hair. In the first of these cases you may have noticed that the eyebrows and eyelashes were falling out, but frequently the hair of the head comes out in large quantities.

Periostitis was the next condition I mentioned, and this is a very usual—indeed, some authorities consider it an invariable—accompaniment of the secondary stage; there is a chronic inflammation specially characterized by night-pain, and if the finger is drawn down

the skin the crest of the tibia will be found to be serrated; it is very chronic and never proceeds to suppuration.

Iritis is not so common. When it does occur it affects first one eye and then, if left to nature, the other, but treatment generally checks its progress. It would be difficult to distinguish syphilitic iritis from rheumatic, but for the concomitant signs, as I believe it never comes without the skin and throat affections. It is said to be unattended with pain like other syphilitic affections, and that there are nodules of lymph effused onto the surface of the iris.

Lastly, condylomata: these, by themselves, when occurring about the genitals, are not necessarily signs of syphilis; any vaginal discharge, or, indeed, any irritation, will produce them, and they are only seen in dirty people and neglected cases. In the first case there is a small one, in the second a very large mass of warty growth; when they occur about the angles of the mouth syphilis is always the cause. Irritation and moisture seem to produce them, and they are not unfrequent between the buttocks and under the foreskin in men, but in women, in the majority of instances, they start in the perineum and vulva, the result of vaginal discharge. They are at first simply flat, raised patches, but eventually they become divided on the surface, and this is the difference between condylomata, or mucous tubercles, and warts. In persons affected with syphilis in all its stages, when they occur, they make rapid progress, and if treated with anti-syphilitic remedies before they become warty, they yield and disappear just as the ordinary skin eruptions, but if left to get into a fleshy condition, they have, as a rule, to be cut off. So much, then, for the various conditions met with in secondary syphilis; some of them are present in the cases under consideration, some are not. Let me briefly pick out the points, first in one and then in the other, that enable us to say that both are syphilis, and then I will make a few remarks on the treatment.

With regard to the histories, if we pay any attention to them, we are utterly at a loss to reconcile them with facts certainly known about the disease. The French girl gives a story of having been married and separated from her husband seven months ago, soon after he had infected her with gonorrhœa, from which she was quickly and completely cured. There is no reason why we should disbelieve this, or the statement that she had a child in May who died in August; but then she also tells us that she got a sore on her

genitals about that time, and two weeks after the rash appeared; that she had sexual intercourse once, and only once, since her husband left her, and that was within the last three months, just before the sore appeared. Knowing what we do of the course of syphilis, and seeing what we see on her, I cannot believe these statements to be true, for the rash to come a fortnight after the sore is impossible; and the same may be said of the sore appearing immediately after infection. It may be suggested that her husband infected her before he left her, but I think that equally impossible, as that would mean an incubation period of seven or eight months. I have no doubt she got infected earlier in the summer than August, as the appearance of the throat and skin is typical of secondary syphilis about the second or third month; there is the mixed rash, which neither itches nor does it pain her; as it is dying away it leaves the brownish stain; the typical condition of the tonsils in syphilis is present, the shotty glands are felt in several places, and there is the serrated condition of the crest of the tibiae. These definite signs are quite enough for the diagnosis. Without any delay she was put on a pill consisting of hydrargyrum, two grains, and opium, one-sixth of a grain, three times a day.

The appearances in the second case are perhaps not quite so conclusive, but still I think sufficiently so. The history she gave was obviously unreliable, for when she found that we discovered that she was some five or six months pregnant, she admitted sexual intercourse last May, which would be about six months ago, which she at first strenuously denied; but assuming that was the only occasion on which she erred from the path of virtue, the time when the rash appeared, some two months after, is quite compatible with the usual course of events, and the primary sore might have been so small and painless that she did not know she had it. What rather surprises me is that the symptoms are so slightly marked, if she has not had treatment. True, syphilis does, so far, get well in some cases if left to itself, but this looks to me just like a case in which there has been active treatment in the first instance, and it is running a mild secondary course. I believe that to be so here, and for some reason best known to herself she is keeping that fact back; anyhow, the characteristic signs that we have before us are the mixed rash, scaly and pustular, which as it dies away leaves the brownish-red mottling, the typical syphilitic throat, the shotty glands, and the

periosteal affection of the tibiae. I do not regard the condylomata as specially characteristic, but there are two points about them rather in favor of syphilis,—one, the fact of their being sessile, and the other, the rapidity of their growth. The same pill was ordered for this patient as for the last, but in addition calomel ointment was applied to the condylomata.

As regards treatment, I think it is generally admitted that the only reliable drug in the primary and secondary stages is mercury, and that is most easily and efficiently administered by the mouth in the shape of a pill, combined with a small amount of opium, to prevent a purgative action. Personally I like to give it in the form of a blue pill, but the hydrargyrum cum creta is perhaps a more common form of administering it. The dose should be small, and it should be given three or four times a day. The rapidity with which the symptoms ameliorate is remarkable. The first of these patients has now been treated nine days and the second five days, and already there is a marked improvement. Given in this way, salivation is rare, and the drug may be continued, as a rule, for six months, or even longer, with marked benefit; it is far better than inducing rapid salivation, as used to be practised, and which, I believe, was to a great extent responsible for the dreadful disfigurements of the face that we formerly saw. I should, perhaps, add that there are two conditions sometimes present in the secondary stage in which another drug—iodide of potassium—is indicated, and that is when there is iritis, and when the patient suffers much night-pain from periostitis. It may either be given alone or in combination with mercury, and I have met with a good many cases in which the now non-official green iodide of mercury given in grain doses has proved very beneficial. Syphilitic condylomata do not require operative treatment, and I expect we shall see in case No. 2 that they will soon disappear. The only difficulty I anticipate is salivation, as it is impossible to regulate the amount of mercury absorbed by the raw surface, and very likely in a day or two we shall have to leave off the pills, and perhaps the ointment as well, on account of the too rapid action of the drug; the moment the gums are at all sore it should be suspended for a day or two.

THE SEVERE FORMS OF HÆMATURIA OCCUR- RING IN THE PROSTATIC ENLARGEMENT OF ELDERLY MEN, WITH THEIR TREATMENT.

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Among the more important complications to which patients with hypertrophy of the prostate gland are exposed is hæmaturia, and the loss of blood occurring in such instances can range through an entire scale, beginning with a mere red or brownish coloration of the urine up to a serious hemorrhage that will fill the bladder with clots and make the situation one of serious danger to the patient. In the majority of cases a hemorrhage of this origin is of little importance and will cease in a short time of its own accord. In some cases, however, active treatment, such as will be outlined later, has to be employed. Finally, in a few cases, and this is a fact not very generally known, a hemorrhage from a hypertrophied prostate necessitates suprapubic cystotomy as a hæmostatic means.

In this connection I may mention a case in which this indication was unquestionable, but in which I was anxious to avoid the operation on account of a peculiarity in the case. The patient, a man of eighty-five, an old sufferer from hypertrophy of the prostate, had as well a calculus lying in a pocket in one side of the bladder, as I had ascertained at a previous operation of lithotripsy performed some time earlier. He was seized one day with violent hæmaturia, which filled his bladder with clots and produced distention of that cavity with intense pain. In spite of this condition, and although I knew he had this encapsulated calculus, I decided to wait before performing suprapubic cystotomy, feeling that, although he had stood lithotripsy successfully a short while before, he was hardly in a condition to undergo cystotomy, however clearly such an operation might be indicated. Fortunately, the hemorrhage ceased, and the patient's general condition soon became normal again. Still, after a certain

lapse of time he began to suffer afresh, as could have been foreseen, and a surgeon of Lille, who knew about the calculus, performed cystotomy, from which the patient died.

I have made this digression not to criticise this operation, which was indicated *a priori*, but to call attention to the accuracy of the opinion of which I have been a defender,—namely, the greater severity of the hypogastric section in old men as compared with lithotripsy. It was for this reason that I did not perform the same operation on this old man six months previously, as I anticipated and feared the result of it.

Since that period I have seen other cases of serious hemorrhage in prostatic patients and should like to bring these facts to notice. Two of these cases were particularly interesting: both were men over sixty years of age and came to my notice almost simultaneously.

The first one, General B., is a very vigorous and active man, who although in retirement is still in condition to undergo quite fatiguing exercise. I took care of him about twelve years ago, while he was still in active service, for urinary stagnation with slight vesical infection. He was obliged to use the catheter, but this did not prevent him from fulfilling his duties perfectly well and from keeping in excellent health.

Two years ago he was suddenly seized after fatigue, although not immediately after, with violent hæmaturia with the emission of pure blood, which lasted for two days and appeared to yield to an injection of antipyrin.

Two months ago I was called to see him again. He had had an abundant hæmaturia for two days, and for the last five hours complete retention of urine and inability to pass a catheter. This hæmaturia had followed the application to the chest of a blister advised by a physician who had been notified of the condition of the patient's bladder, but who in spite of this notice had decided to use a blister. I finally succeeded in passing a stiff catheter, No. 22, through which were eliminated a number of clots, to the patient's great relief, and the catheter was left in position. I advised hot washings, first of antipyrin and then of tannin, three times in twenty-four hours. The following day the hemorrhage, which had appeared to have subsided, began again as violently as ever, and the bladder became distended. I was forced to aspirate the clots, and had great difficulty in doing so; then, under the influence of hot injections, the hemorrhage

gradually diminished, and ceased altogether in five days' time. The patient had lost color considerably, but not enough to give us any uneasiness as to his life; at one time I thought of making hypodermic injections of artificial serum, but this idea was finally abandoned. Since that attack the patient has been in excellent health; there has been no recurrence of the bleeding, and the urine, which had been offensive during the periods of retention, has now become almost normal.

The other case was that of a patient of sixty-five, whom I saw for the first time about fourteen years ago; a surgeon had already made a puncture of the bladder for retention of urine of prostatic origin, but as the retention persisted and the catheter could not be passed, I was called to the case, and succeeded in introducing with a bent staff a catheter which I left in position. Voluntary micturition was finally re-established, and I only saw the patient at long intervals.

Four years ago he had another serious recurrence of retention; the only instrument with which I succeeded in reaching the bladder was a metallic catheter, the different staffs failing completely. There was on this occasion quite a violent attack of hæmaturia, but I was finally able to put a stop to it. When this was over I removed a small phosphatic calculus by lithotrity. Since this date the patient has used a catheter from time to time; he is exposed occasionally, to use his own words, to retention of urine of psychical origin.

On the 16th of last January he sent for me because he was urinating blood in large quantities. For two days previously his urine had been slightly tinged, but as this had often occurred before he did not pay much attention to it; when, however, the hemorrhage rapidly increased he became alarmed, and with reason, as for a while the loss of blood was very serious. I was obliged to place a catheter in position, wash the bladder with water at 50° C., inject a solution of tannin, and aspirate to remove the clots.

In this case as in the former one the attack passed off without any appreciable sign of infection, in any case without rise of temperature. The catheter was left in place for two weeks. To-day the patient has completely recovered. After having been obliged to use the catheter whenever he wished to urinate, he now has to do so only once a day, and not every day at that. He has an enormous hypertrophy of the prostate, and is obliged to use a very long catheter with a very long and marked angle. The catheter for extracting the fragments after

lithotripsy is too short for him, and I could not use it in removing his clots. The previous patient had also a very large prostate, though not so large as in this instance.

These two cases are examples of very serious hæmaturia occurring in prostatic enlargement; at other times the loss of blood is less important, as will be seen from the following history.

The patient, eighty-five years of age, was taken during the last three months of 1896, at intervals of six weeks, with three attacks of hæmaturia, occurring during the latter half of the night. On the two first occasions I only saw the blood on the patient's night-shirt and sheets; but on the third the hemorrhage was so considerable that he passed in the chamber about two glasses full of red urine, which coagulated into a firm, dark-red mass.

On the first two occasions the patient's painful but temporary retention of urine was relieved by a single catheterization, performed with every antiseptic precaution; that put an end to the accident, and the bladder recovered its contractility. On the third, the retention lasted for several days, and I was obliged to empty the bladder three times a day. Since that time the hæmaturia has not recurred. The peculiar feature in this case was the fact that the use of the catheter on every occasion, even the first, when I saw the patient immediately after the hemorrhage, brought nothing but normally colored urine. The hemorrhage, therefore, occurred in the urethra, probably in its prostatic portion. The patient's timidity would not allow me to examine the prostate by the rectum.

The following is another instance of hæmaturia in prostatic enlargement, but of less serious character. The patient, fifty-six years of age, came to see me two years ago. He had had several attacks of profuse hæmaturia in the country, and his local physician had sent him to Paris to see a specialist on the subject. The first man consulted made the diagnosis, without cystoscopic examination, of vesical neoplasm, and proposed a hypogastric section. The patient then saw me, and after examining the case I advised him to postpone the idea of an operation. There were signs of cystitis; I did what was necessary for that condition, which rapidly improved, and then sent him South for the winter. There has since been no recurrence of the serious symptoms; the prostate is large and soft, the bladder empties itself satisfactorily, the patient has a few piles, and has passed some small calculi. The fact that in this instance the general health has

not changed suffices to eliminate the idea of a neoplasm, although the urine is still not clear.

I also find in my notes the mention of an old man of seventy-one, whom I saw in 1896, and who suffered from prostatic enlargement with slight retention of the urine (fifty grammes or 1.7 ounces), and from hemorrhoids, and who a few years ago had an attack of hæmaturia that lasted twenty-four hours. I found nothing in the bladder on bimanual palpation.

I could cite other equally typical instances to show that in prostatic enlargement every degree of hæmaturia can manifest itself, and that in addition to the forms already mentioned, that place the patient in danger of life, there are all the lesser forms that may only occur once, or that may be repeated at more or less frequent intervals.

It is unquestionable that in this category of patients there is a larger number of cases of hæmaturia of *prostatic* origin than is usually believed. In other instances it comes exclusively from the bladder, though this is less common in prostatic patients. In any event, as the bleeding vessels are in the prostatic region, the source of the loss of blood could just as well be considered prostatic as vesical. By this I do not mean that hemorrhage of vesical origin does not exist, or is rare in the patients we are considering. I have seen examples of such hemorrhages, but I think they are less common than hemorrhage of prostatic origin.

The proofs of the prostatic origin of these cases of hæmaturia are derived from the examination of the prostate and bladder during operations, from the ascertainment of the condition of the prostate by rectal examination with the finger, and also by direct inspection. In one case of hæmaturia, for which I was obliged to operate, I *saw* the prostatic origin of the blood; I saw a small artery of the prostate bleeding; I saw and felt the prostate projecting into the vesical cavity like an enormous cervix; I saw its color and purple aspect, and I felt how soft it was. Its volume could be diminished by pressure, as in cases of erectile tumors, and for these reasons I was no longer surprised at the abundance and facility of the hemorrhage, which had justified and indicated operation. When I add that in this case I destroyed the prostate with the actual cautery, and that since the operation there has not been the slightest recurrence of the hemorrhage, I think I shall have demonstrated the

prostatic origin of the loss of blood in that instance. Furthermore, the condition of the patient's bladder, which showed hardly any signs of congestion or of the red patches that are observed in patients whose bladder has bled, was an additional argument in favor of the prostatic origin of the hæmaturia.

It could be objected that it is surprising that a prostate gland should bleed only by its face that opens towards the bladder; but this objection is not a strong one. This bleeding occurs probably because the urethral mucous membrane is stronger than that of the bladder, and because the vessels are more numerous in the bladder than in the urethra.

Prostatic cancer also bleeds into the cavity of the bladder in some instances only. I saw not long ago a patient who was clearly suffering from a cancer of the prostate who had only had one hemorrhage, and that one exclusively vesical in appearance. He had passed blood, not at the beginning of micturition but during the evacuation. Yet it is not rare to see initial hæmaturia, and even species of bloody ejaculations, in prostatic cancer, and no other form of bleeding at all. This kind of hemorrhage, whether abundant or small, can indicate prostatic neoplasm, especially when it occurs before any symptoms of prostatism are present, or, at any rate, while such symptoms are very unimportant; this is particularly true when the hæmaturia is accompanied by retention of urine, so common in prostatic enlargement, but which can also occur in neoplasms, although less frequently.

The diagnosis can be made in different ways, according to the conditions under which the hæmaturia occurs. I shall not consider the diagnosis with renal hemorrhage, although it is not always an easy one, because in most cases there are renal symptoms, while vesical symptoms are absent, and this is sufficient to put us on the right track. When the vesical or vesico-prostatic symptoms are clearly present, how shall we distinguish between a hemorrhage of vesical and one of prostatic origin.

I shall also set aside the cases of abundant vesical hæmaturia occurring when an over-distended bladder has been too abruptly emptied, and shall only consider hæmaturia occurring in patients who have used the catheter habitually for a long time, or else whose bladder practically empties itself spontaneously, making the catheter

unnecessary,—that is to say, hæmaturia occurring under the usual circumstances.

It is in these circumstances that we have to make the diagnosis between the hemorrhage of a neoplasm and of an enlarged prostate.

When the cystoscopic examination is practicable, which is only the case with temporary or intermittent loss of blood, the diagnosis is easy; but when this examination cannot be made, either on account of the hemorrhage or because the urine is not clear and cannot be cleared, the diagnosis can often be made by bimanual palpation, one finger in the rectum, the other hand on the hypogastric region. When, with persistent hæmaturia rendering cystoscopic examination impossible, no tumor is felt by this means, we can only think (when there is a prostatic enlargement) of a simple papilloma, and a papilloma rarely causes a sufficiently abundant, persistent hæmaturia to render cystoscopic examination impossible, especially in its early stages and even later on. At a more advanced period the case is different; but it is only when the papilloma has become transformed that the hemorrhage becomes serious and persistent. Consequently the diagnosis is easy in case of papilloma.

It is usually an infiltrated neoplasm that causes this hemorrhage, especially cancer. In such cases the tumor by which they are characterized can be detected by bimanual palpation, and we ascertain that it is rather more lateral than in the middle line, and that it can generally be separated from the prostate, which is usually small or of moderate size.

In hemorrhage of prostatic origin the gland is voluminous; if a tumor can be felt in the bladder, it is in the middle line, cannot be distinguished from the prostate, and is not painful, as is usually the case with a vesical tumor.

Finally, it is easier to disinfect the bladder of a prostatic patient than that of a patient with a neoplasm; it is seldom that the odor of urine that has been infected can be suppressed in cases of neoplasm, whereas this can readily be accomplished in a prostatic patient.

In cases of insignificant or temporary hæmaturia, the diagnosis between vesical and prostatic origin has less interest. Still, even in such cases it is just as well to try to have an accurate diagnosis and to use the cystoscope. Too much precision cannot be sought for in getting an exact and early diagnosis in a bleeding bladder.

The prognosis of prostatic hemorrhage varies naturally with the amount of blood lost, the frequency of the hemorrhage, the patient's age and condition, etc. These details are too evident to require any elaboration.

The treatment is sometimes very complicated, but in others it is a simple matter. At one time mere rest is sufficient to stop the bleeding, or a washing with hot water, or with a solution of antipyrin; in other cases a catheter has to be put in position to prevent the bladder from contracting, and it is then advisable to leave this catheter open in a urinal. It should, however, be known that in some cases an open catheter will not be tolerated, and that in such rare instances it will have to be plugged, and only opened every two or three hours. Care must be taken that it is very accurately placed; if it has a tendency to come out, or does come out, the bladder becomes distended, contracts, and will bleed afresh.

Through this catheter washings can be made with water at 50° C. for fifteen or twenty minutes, the liquid being injected as gently as possible. A strong solution of antipyrin can then be used, thirty or forty grammes (one or one and a half ounces) of a ten-per-cent. preparation; if that is not sufficient tannin should be tried, hot, one hundred to one hundred and twenty grammes (three and a half to four ounces) of a one- or two-per-cent. solution.

In some cases clots obstruct the catheter, while at the same time they distend the bladder. Short, quick squirts with the syringe may disintegrate these clots, but when this means does not succeed, a large metallic catheter with a moderate curve should be introduced, through which the clots can be evacuated either by the means just indicated or by aspiration.

It should be well understood that the best means of stopping a hemorrhage of the bladder is to prevent that organ from being distended. The bladder ceases to bleed, or only bleeds in great moderation, when it is at rest. I believe I was the first to observe this fact, and I demonstrated its accuracy in 1882, when I did the first operation for tumor of the bladder. I operated during a period of hæmaturia, which on the following day had completely stopped. It is true I had removed the neoplasm, but I had left in the bladder a wound that would have bled freely had the bladder not been at rest. This is one of the points that made a most vivid impression on me and on such of my colleagues as asked to see the sequelæ of the

operation, which interested them a great deal on account of its novelty.

When the bladder has been freed of the clots it contains it should be washed with a hot solution, boric or tannic, or merely with boiled water.

It is an error to think that the bladder contains no more clots when no more come out by the catheter. In the case in which I operated I found quite a large clot in the bottom of the bladder, although I had washed the vesical cavity vigorously before making my incision. When no operation is done, the urine, during the days that follow the evacuation, looks as though tinted by stale blood, and occasionally contains a brownish or chocolate-colored piece of old blood, although there is every reason for believing that the hemorrhage has come to an end.

It may happen, nevertheless, that the hemorrhage cannot be stopped; the patient grows weak and takes fright. In such conditions no hesitation should be felt in advising an operation, the hypogastric section, which, owing to the facility that it gives for inspection by sight of every portion of the vesical cavity, enables us to stop the loss of blood with certainty. In fact, the mere putting the bladder at rest is often enough, and the hemorrhage does not recur after the operation. The application of forceps, or plugging, seems to me rarely indicated.

Finally, the general treatment of the patient should not be lost sight of. Personally I prefer hypodermic injections of large doses, two hundred and fifty to five hundred grammes (from nine to eighteen ounces), of a seven-per-thousand solution of chloride of sodium, two or three times a day, to the administration of tonics and stimulants.

"OBSTRUCTIVE SUPPRESSION" OF THE URINE.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY COLLEGE HOSPITAL.

BY **GEORGE VIVIAN POORE, M.D., F.R.C.P.,**

Physician to University College Hospital; Professor of Clinical Medicine and Medical Jurisprudence in University College, London.

GENTLEMEN,—The patient whose case I wish to bring before you is a butler, aged fifty-eight; fat, flabby, gray-haired, with a florid countenance and rather big, pendulous abdomen. His appearance on admission to the hospital betokened too much food and too little exercise, but was not suggestive of intemperance.

He was admitted on June 8, 1896, and died in the early morning of June 10, thirty-five hours after his admission.

When I first saw him, on the afternoon of June 9, his appearance did not suggest dangerous illness or impending death. He was able and willing to answer all questions, and he told us that he was troubled with constant vomiting, and that he had not passed any urine since June 3.

His previous history was negative. He had enjoyed good health all his life. He had not suffered from any of the symptoms of renal colic or Bright's disease, and had never passed blood in the urine or been troubled with stricture of the urethra or any derangement of the bladder. He had never suffered from gastric or intestinal troubles, the bowels had always been regular, and there was no "rupture."

It was on or about May 20 that he says he began to feel "sick" and "faint" and unfit for his work. On May 24 he vomited repeatedly; a doctor was called in, and the patient took to his bed, where he remained until his admission.

The physical examination was as negative as the history, but owing to the large amount of fat the examination of the abdominal cavity was a matter of difficulty, and the conclusions drawn from it were necessarily doubtful.

There was neither pain nor tenderness referable to any part of the urinary tract. A catheter was passed with ease into an empty bladder. There was no evidence of any tumor connected with the kidneys.

During his stay in the hospital the patient passed less than twenty cubic centimetres of urine. This was slightly alkaline, contained some epithelium from the pelvis of the kidney, ureter, and bladder, but no albumen. Owing to the small quantity passed the specific gravity was not taken.

The patient vomited whenever an attempt was made to give him food. The vomited matter consisted of bile-stained fluid, and was not stercoraceous.

The bowels acted twice, freely and naturally, the tongue was clean, and there was no urinous odor of the breath. The pupils were equal, of medium size, and reacted well.

The temperature was normal or subnormal, fluctuating between 98.4° and 96.4° F.

The pulse and respiration were both slightly quickened, and the respirations were quick in proportion to the pulse. Just before death the pulse was 96 and the respirations 40.

The pulse was perhaps a little "hard," not markedly so. There was not much evidence of arterial change.

The patient was quite conscious, had no headache, was not in the least comatose, and had no convulsion or twitching of the muscles until within a few hours of death, when it was noticed that the muscles were "very tremulous and quivering" on the least exertion.

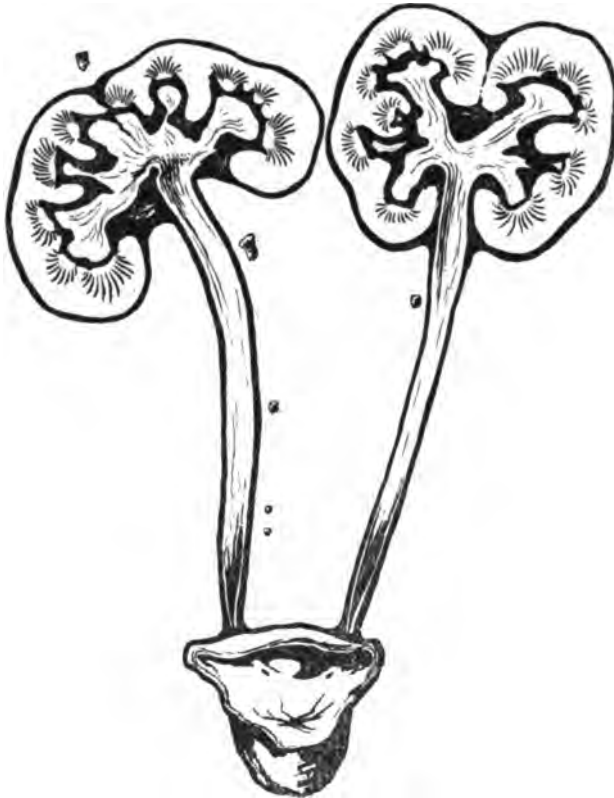
At six p.m. on the evening of June 9 the patient showed a tendency to "wander," became somnolent, and complained of shortness of breath, and eight hours later he died somewhat unexpectedly, the heart and respiration apparently failing *pari passu*.

At the post-mortem examination there was found a large excess of internal fat in the usual situations. The heart weighed a pound and a quarter, and there was slight atheromatous change in the aorta. The left lung was adherent at the base; both lungs were emphysematous and the seat of marked hypostatic congestion. The abdominal viscera were normal except for slight submucoid hemorrhages in the stomach, the result probably of the frequent and severe vomiting.

The main interest naturally centred in the urinary organs. A

catheter was passed into the bladder with a view to getting a sample of urine, but the bladder was empty. The kidneys, ureters, and trigone of the bladder were removed together, and are represented in the accompanying drawing (Fig. 1), which has been made by Mr. Lawrence, F.R.C.S., the curator of the College Museum. The original drawing was life-size, so that in the reproduction the relative pro-

FIG. 1.



Showing the position and relative size of five uric acid calculi found in the ureters and one in the right kidney of a case of complete suppression of the urine.

portions are maintained. The pelvis of the kidney on both sides is somewhat large, but there is no marked dilatation of any part of the urinary tract, no damming back of urine behind an impassable obstruction, nothing whatever of the nature of a hydronephrosis, for it is noteworthy that no urine was to be found anywhere. Some small, irregularly shaped uric acid calculi were found. On the *right*

side we found—1, one weighing under two grains, in the sacculus of the kidney; 2, one weighing five grains, lodged in the ureter about three inches below the pelvis; 3 and 4, two, both very small, about two inches from the bladder; and 5, one, no bigger than a pin's head, about half-way between No. 2 and Nos. 3 and 4. On the *left side* only one calculus was found. This weighed under two grains, and was situated in the ureter about two inches below the pelvis of the kidney. These calculi are shown in the accompanying drawing.

Both kidneys had a somewhat lobulated appearance, but the capsule separated easily on both sides, and there was no sign of granulation. The pelves were obviously dilated, and the cortical substance felt hard and appeared to be somewhat shrunken. Under the microscope there was abundant evidence of small-celled infiltration between the tubules, due probably to consecutive nephritis, consecutive, that is, to the irritation of the lower urinary tract. This chronic inflammatory process had hardened the kidney substance, but the complete absence of "granulation" shows that we must distinguish between the kidney and an ordinary granular contracted or gouty kidney.

On the bed-board of this patient, in the space left for diagnosis, are written the words "obstructive suppression of urine." This diagnosis is not correct, for the post-mortem examination has shown us that if either kidney had secreted urine, such urine could certainly have found its way into the bladder, for on neither side was the obstruction in the ureter sufficient to stop the trickling of fluid. That there was suppression of urine is clear enough, but it is equally clear that there was no impassable obstruction in the ordinary sense. There was no evidence of increased pressure in either kidney. The symptoms were mainly those which are given in text-books as due to "obstructive suppression," but I would warn you that symptoms are seldom quite according to the book, especially in chronic disease, and in this case the normal pupils and the incessant vomiting were, if we regard the case as one of "obstructive suppression," unusual.

Vomiting is a common symptom in kidney-disease. It is often one of the earliest signs of uræmia, which is the name given to that form of auto-intoxication which results from the faulty action of diseased kidneys. In this case, however, there was no headache, no convulsion, and no mental obscurcation, so that it is doubtful whether the vomiting is to be regarded as uræmic. Vomiting, again, is

common in renal colic, and it is remarkable that this patient with jagged calculi in both ureters had not, and, if we are to believe the history, never had had, any symptoms of renal colic. It is doubtful, therefore, whether we are to regard the vomiting as due entirely or in part to the irritation of the ureter by calculi lodged therein.

If a patient vomits everything which is put into his stomach, inclusive of water and other fluids, it is clear that the waste products of metabolism, instead of being flushed out *via* the kidneys, will remain to poison their host. We know that in death from starvation life is seldom prolonged more than a week at most if *water* as well as *food* be withheld, and that in such cases death is preceded by a foul smell of the breath and body and a somnolent delirium, which betokens one form of uræmia. If food alone be withheld and water is permitted *ad libitum*, the patient may live many weeks and the indications of "uræmia" are absent. Again, if fluids be vomited, the amount of urine passed must be diminished, and you will remember that in this case we carefully considered the point as to whether the vomiting was not possibly due to obstruction of the alimentary tract, and the suppression of the urine a mere physical consequence of the rejection of fluids by the stomach.

If the kidneys, from any cause, are incapable of performing their functions, it is evident that the vomiting of *food* must be regarded as probably beneficial *under the circumstances*, because the ultimate products of the digestion of food not being able to escape by the kidneys, the vomiting has the effect of relieving the damaged organs from the exercise of their function, and affords them the rest necessary for recovery. In cases of acute uræmia the vomiting relieves the kidneys and the stomach acts as a safety-valve.

The vomiting in this case must be regarded as in part necessitated by the state of consecutive nephritis and in part, possibly, as a reflex phenomenon brought about by the irritation of the ureters by the calculi.

There is another element in the case which must be touched upon. I have already insisted on the fact that the evidence of absolute physical obstruction of the ureter is very slight; and now I must remind you that irritation of the lower urinary tract is capable of causing a reflex inhibition of the kidney. It is well known that the passage of a catheter is not unfrequently followed by a temporary suppression of urine, and the same phenomenon has been observed

as a result of operative procedures affecting the pelvis of the kidney or ureter. It is to be presumed that irritation of the lower urinary tract produces a contraction of the renal vessels and a consequent suppression of secreting function. This spasm of the renal vessels is succeeded by a reactionary dilatation and congestion, and the first urine passed, after an attack of reflex suppression, often contains a small quantity of albumen or blood. It is impossible not to believe that reflex inhibition of the kidney function was one element of the case, and, clearly, the presence of hard angular calculi in *both* ureters (a most unusual occurrence) was well calculated to bring about a catastrophe which is well known to occur under similar circumstances.

At the same time, it is difficult to believe that a reflex spasm of the renal vessels can continue for a whole week; and there are two other facts in the case which deserve attention. It is important to note that the hard angular calculi which were undoubtedly present in our patient's ureters produced no renal colic during life. There was nothing in the history pointing to renal colic, and we completely failed to detect any tenderness over the kidney or along the course of the ureters. Post mortem we found the ureters decidedly big in their entire length. Both were alike, and the large diameter was observed below the position of the calculi as well as above. This condition of the ureters, combined with the absence of renal colic, which is caused by the contraction of the muscular coat of the ureter, forces one to conclude that the muscular coats of the ureters were incapable of vigorous contraction, and that there was a parietic or paralytic element in the case. This theory, I think, gains support from the general condition of the patient, which was one of feeble flabbiness.

Lastly, it must be remembered that the kidneys were diseased. The pelvis was dilated and the papillæ somewhat flattened. The kidney substance was pale, and there was a small-celled infiltration between the tubules. There was, in short, a condition of consecutive nephritis, which, beginning in the pelvis, pursues a slow centrifugal course until the kidney substance in severe cases shrinks to nothing. Ordinarily, intertubular nephritis affects the cortex rather than the pyramids. A difficulty in removing the capsule is one of the early signs of gouty interstitial nephritis, whereas in the case under consideration there was well-marked small-celled infiltration

round the tubules adjoining the pelvis, but the capsule slipped off easily.

The case is one of great interest. The diagnosis of suppression of urine not due to obstruction in bladder or urethra, or to Bright's disease, or to any general disease, was easy. We knew that unless the suppression came to an end the patient could not live a week, and our prognosis was fulfilled. We labelled the case "obstructive suppression" because the symptoms were mainly those which are characteristic of the condition which has received that name.

A label cannot give the whole facts. The label in this case may remain, but it is clear that the part played by mechanical obstruction was not a predominating one.

TRAUMATIC PERITONITIS.

CLINICAL LECTURE DELIVERED AT THE HÔPITAL DE LA PETIT.

BY PROFESSOR BERGER, M.D.,

Professor of Surgery in the Paris Faculty of Medicine, France.

GENTLEMEN,—You can hardly believe, from her present satisfactory appearance, that when the woman who is to form the subject of our lecture to-day entered the hospital some time ago she was in a most precarious condition. An examination to-day shows that there is no tenderness on palpation of the abdomen, and the patient feels so well that she is disappointed at not having something substantial to eat, and complains bitterly of hunger.

Her history is as follows: About three weeks ago, during a domestic quarrel, she was thrown down and trampled upon. On the following day she suffered considerable gastric pain, and vomiting set in. She remained in this condition for several days, and then a temporary improvement occurred. Ten days after the receipt of the injury her condition became so much worse that she was obliged to go to bed, and the following day her abdomen began to swell rapidly and constipation resulted. There were no evacuations of the bowels of any kind whatever, and she did not even expel any gas. The physician who was consulted ordered an enema, which did not produce any noticeable effect, and, fearing intestinal obstruction, he sent her to the hospital. I examined her immediately after her arrival and found that she was suffering from intense pain of such a character that it was impossible to touch the abdomen in the most gentle way without causing her to exclaim. There were also profuse meteorism and constant vomiting. In a word, all the symptoms of intestinal obstruction were present. The stomach, however, was symmetrically distended, and the sensibility to touch was particularly pronounced in the upper region of the left side, and there was no dyspnoea, showing that the diaphragm was not encroached upon. The matter vomited was of a vegetable-green character and was

mixed with particles of white barley which the patient had been eating. Her general condition was excellent. The eyes were slightly sunken and the skin presented a somewhat jaundiced appearance. Otherwise there was nothing of interest to note. The pulse was rather rapid but strong, and the skin felt about normal. Similar symptoms might be met with in that form of intestinal paralysis which has sometimes been called paralytic pseudo-strangulation. Such a paralysis is caused either by a powerful reflex stimulus or most frequently by peritonitis.

It was necessary to arrive at a diagnosis at once, as in cases of intestinal obstruction no faith can be placed in medicinal treatment alone, and one should be prepared to resort to surgical interference promptly whenever the symptoms point to such a procedure. In my judgment the case before me was evidently one of traumatic peritonitis with consecutive intestinal paralysis, and the subsequent course of the case has justified my opinion. I was inclined to this diagnosis rather than to that of intestinal obstruction for several reasons which I shall detail to you. There are two kinds of intestinal obstruction, acute and chronic. The chronic obstructions are caused by one or other of two affections, either (1) obstinate constipation which has extended over a considerable period and given rise to the formation of an enormous amount of fæces; such a form of constipation is met with in people of advanced age; or (2) it may be due to the presence of a tumor, such as cancer or sarcoma, causing a mechanical obstruction to the passage of the fæces. The acute variety, on the other hand, often coming on suddenly, is due to one of several causes, such as hernia, the presence of bands of lymph, etc. This latter form of obstruction belongs almost exclusively to young subjects. In the patient before us the symptoms developed little by little, and this is not the method by which acute strangulation develops, therefore we may exclude the discussion of that possibility. Secondly, the distention of the abdomen in this case did not present the form usually shown in strangulation. It ~~was~~ uniform, without any of the symptoms which are usually seen in the latter condition. In acute strangulation certain intestinal loops are more distended than others, and the outline of the bowels may become clearly defined. Sometimes it is even possible to detect the vermiform movements of the loops in thin subjects.

Now, as to the course of the pain. It was, as I have already

stated, very intense, while in intestinal strangulation it is less apt to be acute and is less continuous. There are, besides, in the latter condition times when the pain ceases or scarcely exists at all. The abdomen can then be touched without exciting any pain, while on the other hand there are also attacks of excruciating pain resembling colic and lasting from one to two minutes, during which the patient suffers intensely, but when this colic has passed ceases to suffer at all, though greatly fatigued by the attack which has just passed. In our patient, on the contrary, the pain was continuous, and she suffered intensely without any intermission.

In intestinal strangulation the material vomited is either the contents of the stomach or fecal matter; generally there is a mixture of the two. Occasionally it is streaked with blood. This vomiting almost always ceases at the end of two or three days, to begin again later on when the abdomen becomes distended. Then the matter vomited is of a brownish color, and is termed stercoraceous. We find no such condition of affairs in our patient. The matter vomited was of a vegetable-green color and the nausea was almost continuous, so that thus far you will observe we have met with symptoms in the present case quite distinct from what we would expect to find in a case of intestinal strangulation.

Let us now proceed with our examination and take into account the general condition. The skin was hot, the pulse quick, and there was slight subacute jaundice, all of which symptoms pointed to some inflammatory condition. Her temperature, moreover, was considerably increased, while in intestinal strangulation the temperature is usually lowered and the skin is cold and clammy.

The diagnosis having been made, it was then necessary to determine the exact cause of the peritonitis. In female patients it is always well to remember the possibility of puerperal complications. On questioning the patient, we find that she had been confined some six months previously, and that she had noticed a vaginal discharge and pains in the abdomen in consequence of having gotten up seven days after her confinement. Moreover, she stated that after receiving a plentiful supply of the blows which had brought on her trouble she noticed a considerable vaginal discharge, and this fact led me to make a careful vaginal examination, but I was unable to discover any lesion. The uterus appeared to be normal and freely movable, and pressure in the ovarian regions did not cause any pain,

nor was there anything found in the cæcum which would in any way account for her condition. The possibility of a biliary calculus giving rise to her symptoms occurred to me, as certain cases have been put on record where biliary calculi have caused an apparent strangulation associated with peritonitis. Careful inquiry, however, in this direction failed to develop any lesion in the hepatic region.

The existence of traumatic peritonitis having by this time been demonstrated beyond a doubt, the question of surgical interference came up. Should we resort to operation? Had she perhaps ruptured her intestines? These were questions that had to be answered. This latter possibility seemed, however, remote, from the manner in which her symptoms had developed. In any case of rupture of the bowel due to traumatism, such as the kick of a horse or blows of the heel, foot, and fist,—for I have seen several such cases,—the symptoms develop rapidly and as quickly prove fatal. In such cases the peritonitis certainly develops within fifteen hours, and in a very few cases may even appear somewhat later. Thus it is possible for only the mucous coat of the intestines to be ruptured by a blow on the stomach, and such rupture to be so small as to be covered in by the muscular and serous coverings which temporarily occlude the little opening. Adhesions soon form and complete recovery may result, or the lesion may be opened afresh on some sudden movement or perhaps by the passage of fæces, and the adhesions having been broken up, peritonitis may set in. Dr. Reclus has very clearly demonstrated these facts by a number of personal experiments. Or, again, it may happen that after rupture of the intestine the opening may be occluded by the bulging through of the deeper-lying tissues, and later a superficial slough may form, and this becoming detached, perforation results and peritonitis supervenes. In both of these cases cœliotomy is indicated and should be performed at once. In the patient before us, however, the interval between the accident—i.e., the blows she received—and the peritonitis was considerable. Ten days had elapsed, during which she had suffered somewhat, but there was no marked evidence of peritonitis. It seems certain, therefore, that the two causes which I have just described were not at work in this case. Why, then, did her peritonitis develop so slowly? I think it can be explained in the following way. In consequence of the blows received a bloody effusion into the abdominal cavity occurred, either between the layers of the mesentery or in the meshes

of the great omentum. It is impossible to say at exactly what point this effusion took place, but some such phenomenon was certainly present. During the first few days this effusion manifested itself only in a sort of threatening peritonitis accompanied by slight pain and vomiting. Afterwards adhesions were formed and the effusion became encysted, but under the influence of some movement made while the patient continued at her occupation some of the adhesions were broken up and a frank peritonitis declared itself. This seems a plausible explanation of her condition.

As to the treatment in the majority of cases of traumatic peritonitis which have developed suddenly, the abdominal cavity should be opened and cleansed, the injured viscus carefully sought for, and the necessary repairs made if possible. In a case like the present one, where the traumatism was of long standing, the indications are very different. The abdominal cavity would no doubt present adhesions which we would be forced to go through in order to find the point from which the trouble originated, and the peritoneum might very readily become infected. In the present case a centre of inflammation certainly exists, but it has by this time become circumscribed and no longer threatens the life of the patient. After a time it may suppurate and form an abscess, which may either open spontaneously into the intestine or may have to be opened externally, but in such a case the indications are simple and the prognosis excellent. If, on the contrary, we would operate on this case at the present moment, the contents of the abscess would certainly penetrate into the abdominal cavity, and we might not be able to avoid general infection. On the other hand, we must not forget that this focus of inflammation may be entirely absorbed, and the patient may recover without any after-effects. Therefore, basing my opinion upon the following three facts,—(1) the great danger of operating in cases of traumatism of long standing; (2) the existence of a circumscribed abscess, which may become encysted or form merely a simple abscess easy to open; (3) the possibility of resolution and consequently of spontaneous recovery,—I believed myself justified in waiting.

It is not good practice, however, to be satisfied with the observation, "An immediate operation is not necessary; we will wait and see what may develop." Every preparation should be made for the operation, which may become imperative at any minute. If the symptoms are aggravated on the following day, no time should be

lost, and an immediate operation performed. After opening the abdominal cavity, if the seat of inflammation cannot be reached by a median incision without breaking up protective adhesions, a lateral incision should be made as well, in order to evacuate the pus, if possible, without infecting the general peritoneal cavity. If, on the other hand, on the following day the local conditions are only slightly aggravated, and the general condition remains the same or has, perhaps, slightly improved, then you may be justified in waiting still longer. Whenever grave symptoms develop, cœliotomy should be resorted to at once.

The greatest attention must be given to the patient, watching him attentively from day to day. Upon the slightest alarm, operation should be resorted to. This is what I have done in this case; everything being in readiness for the operation, I waited and examined the patient most attentively every morning. The general symptoms improved after twenty-four hours, and the vomiting ceased. Again, twenty-four hours later the abdomen was much less sensitive, and the patient suffered less. Three days later a spontaneous evacuation of the bowels took place. All the alarming symptoms of peritonitis disappeared little by little, and now the patient is in a very satisfactory condition, and may almost be considered as cured. This is a very interesting case, the particulars of which you should bear in mind, and it shows that we must never have an absolutely fixed rule about the treatment. Had I been a partisan of operative intervention in all cases, without exception, and had I not considered the various reasons which I have laid before you,—in a word, if I had resorted to a laparotomy,—this patient would perhaps be dead. In postponing the operation, and waiting carefully, surgical intervention was avoided and the patient recovered.

THE SURGICAL TREATMENT OF GALL-STONES.

LECTURE DELIVERED BEFORE THE TORONTO MEDICAL SOCIETY.

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LECTURE II.

VARIETIES OF OPERATION.

GENTLEMEN,—In considering the first half of our text the general subject was taken up. It is now necessary to discuss individually the forms of operation which may be adopted. Before doing so, it is advisable to define the terms that will be met with in the recent literature of the subject. These terms are as follows:

Cholecystotomy, incision into the gall-bladder with no further surgical procedure; frequently used in place of cholecystostomy.

Cholecystostomy, incision into the gall-bladder and formation of a fistula through the abdominal wall.

Cholecystectomy, extirpation of the gall-bladder.

Cholecystendysis, incision of the gall-bladder and removal of its contents and restoration of the incised wall by suture, with return of the gall-bladder to the abdomen.

Cholecystenterostomy, the establishment of an anastomosis between the gall-bladder and the intestine.

Choledochotomy, incision of the bile-duct.

Choledochectomy, excision of the gall-duct.

Choledocholithectomy, incision of the bile-duct and removal of a stone.

Choledocholithotrixy, crushing of a gall-stone in the gall-duct.

CHOLECYSTOTOMY; CHOLECYSTOSTOMY.

The records of a large number of cases of cholecystotomy can be found in recent medical literature. The operation is applicable to

cases in which we have a distended gall-bladder containing gall-stones or pus. After the incision has been made as previously described, the gall-bladder is drawn into the wound and sponges are packed around it to protect the peritoneal cavity from contamination. The bladder is then punctured with a trocar and the fluid contents removed. If the fluid is bile-stained, the cystic and hepatic ducts are pervious. If a white mucous fluid is found, the cystic duct will be found impervious. After withdrawal of the trocar the opening in the gall-bladder is enlarged by scissors or scalpel, the left index-finger is introduced, and if gall-stones are present they will be felt, and, by means of the scoop, held in the right hand, the left index-finger being in the gall-bladder, they can be readily removed. If the cystic duct is impervious, it must be carefully manipulated from without to determine the location of any stone that may be blocking its calibre. If no stone can be found, a probe should be passed to determine the presence of a stricture; if a stricture is present, the operation of cholecystectomy, or extirpation of the gall-bladder, must be considered. If a stone is found, its removal may be accomplished either by a process of stripping with the index-finger of each hand placed on the sides of the duct, or by means of small forceps or the edge of the scoop passed in through the opening into the gall-bladder; or, if these methods fail, by direct incision into the duct itself. I have generally been able to lever the stone from its position by means of a small scoop. The small gall-stone forceps I have found of little use

On one occasion I incised the cystic duct. Some operators wash out the gall-bladder immediately after it is opened to prevent the transplantation of septic material from its interior to the peritoneal cavity. The washing out assists in the removal of the stones just as the stream of water used by the otologist assists him to remove a foreign body from the external auditory canal. During the washing the gall-bladder should be drawn well out of the wound. If the bladder is small and contracted it can scarcely be washed out with safety. We must then rely on sponges for the absorption of the escaping contents. I have ceased washing out the gall-bladder unless its contents are purulent. I am satisfied that there is more danger of contamination of the peritoneal cavity when the gall-bladder is washed out than when it is not washed out. Sponges will afford ample protection if properly used.

After the obstruction has been removed from the cystic duct, bile will, in some cases, flow at once through the opening, and in other cases will not flow for some hours after the patient has been put back to bed. The hepatic and common ducts should now be palpated carefully to ascertain their condition. If no further obstruction is found, the gall-bladder should be fastened by a continuous suture to the abdominal wall. I begin by fastening the silk in a bow-knot and end it in the same way. This facilitates its removal. Unless this suture can be completely removed it is liable to prevent the opening into the gall-bladder from closing. Before this continuous suture is placed I introduce a long rubber drainage-tube into the gall-bladder and allow the end of it to hang four or five inches out of the wound; bile is conveyed away from the wound by this procedure. After the opening in the gall-bladder has been closed snugly about the drainage-tube the rest of the incision is approximated by interrupted sutures in the usual way. A piece of rubber dam is then passed on to the tube and the wound dressed. If the drainage-tube has been properly placed, only the pads inside of the rubber dam will be wet with bile, and the wound will heal more readily. If there has been no empyema of the gall-bladder, the drainage-tube should be removed in two or three days. The wound will have healed sufficiently by this time to protect itself from the irritating properties of the bile, and if the drainage-tube is left much longer the gall-bladder will become irritated.

If there has been suppuration of the gall-bladder, it should be washed out twice a day until the suppuration ceases. I have used various solutions for this purpose; they should be unirritating, as the mucous membrane of the gall-bladder, when thickened, is prone to bleed. I prefer boracic acid in a solution containing two grains to the ounce of water.

In all cases the fistulous opening will remain for some time. In one of my cases the fistula remained open for nearly three months, and so much bile escaped that it ran into the man's boots. After the persistent use of nitrate of silver stick, the opening closed. In one case I was obliged to operate a second time to close the fistulous opening. The bile escaped periodically into the bowel and at times escaped through the fistulous opening. There was no obstruction of the common duct. I therefore dissected off the gall-bladder from the abdominal wall and closed it by inverting the edges of the open-

ing and bringing peritoneum to peritoneum by two layers of sutures; very fine silk was used, and the end of this continuous suture was drawn up through the wound. The fistulous opening closed, but for weeks the silk suture continued to come away. The patient is now cured.

Some observers believe that the escape of bile, occurring as it did in this latter case, is due to a dragging on the cystic duct and an interference with the valve of Heister. The bile escapes through the fistula when the patient is in the recumbent posture, and passes on into the intestine when the patient is in the erect posture. Owing to the fact that considerable manipulation is required, in all these cases, to remove stones from the gall-bladder and cystic duct, and thoroughly to explore the condition of the common duct, the operation of cholecystotomy or cholecystostomy should never be performed in two stages.

CHOLECYSTECTOMY.

Extirpation of the gall-bladder is indicated in the following cases:

First, hydrops and empyema of the gall-bladder with occlusion of the cystic duct by stricture; secondly, destruction of the wall of the gall-bladder by ulceration, gangrene, carcinoma, and by traumatism where the opening cannot be sutured owing to the extent of the damage done; thirdly, when a stone is impacted in the cystic duct and cannot be removed from within the gall-bladder, a choice may be made between choledocholithectomy (incision of the bile-duct and removal of the stone) and cholecystectomy (removal of the gall-bladder with ligature of the cystic duct); fourthly, in cases in which the gall-bladder is so contracted that it cannot be closed or sutured to the parietes, a choice may be made between cholecystectomy and cholecystotomy with drainage, after Morison's method through the loin, or by a drainage-tube inserted from the front.

For the performance of the operation of cholecystectomy the cystic duct is divided between two ligatures and the gall-bladder is removed; a continuous suture may then be placed at the divided end of the duct to draw the peritoneum more closely around it, just as we cover the stump after removal of the vermiform appendix. If the gall-bladder is intimately attached to the liver, a good deal of hemorrhage may result from the separation of the adhesions, but such hemorrhage can generally be checked by forcipressure and gauze pressure

and by ligature. Hemorrhage from the liver will often cease if the bleeding surface is exposed to the air for a few minutes. It is not advisable to attempt to control this hemorrhage by forcipressure, because the liver tissue will be crushed. Unless some large hepatic vessel has been torn into, hemorrhage from the liver need not alarm the operator except in the presence of jaundice.

A partial cholecystectomy has been performed by some operators; portions of tissue have been removed from an enlarged gall-bladder and the remainder has been sutured and dropped back into the abdominal cavity. I have seen very large gall-bladders opened, and they have always contracted after the operation. A partial cholecystectomy is, in my opinion, unnecessary. It lacks one great element of safety,—namely, external drainage. A drainage-tube should always be inserted and placed down over the stump of the cystic duct after the performance of cholecystectomy. It need not be left for more than twenty-four hours if there is no leakage.

CHOLECYSTENDYSIS.

In this operation the gall-bladder is sutured and immediately returned to the abdominal cavity. I have never performed the operation. It has one great element of danger,—want of external drainage. A drainage-tube may be inserted at the termination of the operation into the peritoneal cavity in close proximity to the gall-bladder, but even this precaution may not be sufficient to overcome the danger of extravasation of bile from the giving way of the sutures during the subsequent violent efforts produced during the act of vomiting. The cystic duct may be temporarily occluded by mucus or bile; if this occurs there is danger of a leakage of bile from the restored gall-bladder. If successful, the operation will not be followed by an external fistula. The operation has several able advocates. Korte recommends it; he reports several successful cases. He uses two rows of sutures, and also uses an omental flap. He considers that after this operation there is less tendency to the formation of hernia. It is good surgical practice to perform either cholecystendysis or cholecystostomy.

CHOLECYSTENTEROSTOMY.

Some operators prefer immediate performance of this operation, while other operators would perform cholecystotomy. Gaston gives credit to Nussbaum for first suggesting the operation, and to Wini-

warter for having first accomplished the desired result by this operation upon the human being. Courvoisier's indications for the operation are as follows:

First, when biliary fistula, whether traumatic or ulcerative or operative, cannot be cured; secondly, when we have a permanent obstruction of the common bile-duct, *except when this obstruction is due to an impacted stone*; and thirdly, in traumatic and ulcerative communications between the common duct and the abdominal wall (Gaston). One might also add cases in which such communications between the common duct and the abdominal wall are the result of direct incision of the common duct, an operative traumatism. Since the introduction of the Murphy button, cholecystenterostomy has been advocated by some authors as the ideal procedure in cases in which it can be readily carried out. The gall-bladder is in this way anastomosed to the duodenum, and the bile is diverted into a new channel. The elastic ligature I have tried in the human being and found wanting; direct suturing is tedious and difficult. The Murphy button answers every indication; it has but one danger,—namely, that it may, instead of passing on into the intestine, drop back into the gall-bladder. I believe that the button may be so improved that this danger will be avoided. To obviate this danger several operators have recommended the use of long pieces of silk thread; these should be attached to the intestinal portion of the button and should be introduced into the intestine before that portion of the button is inserted. They are allowed to float freely down the lumen of the intestine; the vermicular action of the intestine and the onward passage of fecal matter will have a tendency to drag on these ends and, by the slight force exerted, to pull the button into the intestine after it has ulcerated its way through the approximated gall-bladder and intestinal walls.

I have reproduced a plate, in my first lecture, from Murphy's work;¹ this represents the manner in which the gall-bladder and intestine are united. Murphy gives the following directions for the performance of the operation. "He uses the vertical incision; gall-bladder and duodenum are drawn into the wound; a needle with fifteen inches of silk is inserted in the duodenum directly opposite to the mesentery and at a point near the head of the pancreas; a stitch is taken through the entire wall of the bowel, one-third of the

¹ INTERNATIONAL CLINICS, Vol. III., Seventh Series, October, 1897, p. 286.

length of the incision to be made; the needle is again inserted and again brought out at the distance of another third of the length of the incision in a straight line with the first; a loop is then left at the end, and the needle is run in the same manner on the other side of the intended incision. This, in reality, forms a purse-string suture; a loop is left at the one end and the two ends of the thread are left at the other, so that they can be subsequently tied around the button. A similar purse-string suture is applied to the wall of the gall-bladder; an incision is now made in the intestine two-thirds of the length of the diameter of the button to be used; the running thread must be carefully avoided; the button is then slipped in and the purse-string suture is tied tightly around the central cylinder. A pair of hæmostatic forceps are used to hold the button in position. The gall-bladder is now incised two-thirds of the length of the diameter of the button and the gall-stones and fluid contents of the gall-bladder removed; the other half of the button is inserted through the opening and the purse-string suture tied. This half of the button is also held with hæmostatic forceps. These forceps must not be tightly compressed, or the thread of the screw of the button will be injured. The forceps are then removed and the two portions of the button are lightly compressed together; the edges of the cut must come entirely within the clasp of the button before it is completely closed. Sufficient pressure must be used to bring the serous surfaces together. The elastic pressure of the spring cup produces pressure atrophy of the tissues and afterwards leaves an opening larger than the button."

No doubt the fistulous opening will contract, but will remain of a size sufficient to permit the bile to escape into the intestine. Some authors are still in favor of the immediate suture; as the button achieves further success they will be willing to adopt it as the best surgical procedure in cases in which the operation is indicated.

In two cases in which the Murphy button was used for the relief of obstruction due to malignant disease the patients died. In the other cases recorded by Murphy all recovered. The indications for the operation are not clearly stated. One operator performed this operation for dropsy of the gall-bladder; another one for obstruction of the cystic duct; others for obstruction of the common duct by gall-stones. Many of these cases would not come under the indications for this operation given by Courvoisier.

It is no doubt much easier to perform the operation of chole-

cystenterostomy with the Murphy button in cases of obstruction of the common duct by gall-stone than to remove the stone, but Courvoisier distinctly states that it should not be performed when the permanent obstruction of the common duct is due to the presence of a gall-stone. I am satisfied that many stones in the common duct can be easily removed if the method I will describe in another place is adopted. In my third case of obstruction of the common duct I intended to perform the operation of cholecystenterostomy, but after the patient's abdomen was opened I chose the operation of choledocholithectomy instead. I am satisfied that the patient is in a better condition to-day than if the stone in the common duct had been left *in situ*.

I have, however, been carefully watching an elderly gentleman of sixty-two who suffered from obstruction of the common bile-duct produced by an impacted gall-stone. I anastomosed the gall-bladder with the colon and left the stone *in situ*, owing to the fact that it was impossible to separate the dense adhesions around the duct. The duct could not be isolated. Since the operation bile has been flowing into the colon. He has suffered from no distressing symptoms, and appears to be in perfect health. The operation was performed with the smallest size of Murphy button supplied in sets of four. The button passed on the fifteenth or sixteenth day after operation. Care was taken to allow long ends of silk, tied to the button, to float down the lumen of the intestine, in order that the vermicular action would aid in producing traction on the ligatures and the release of the button into the intestine and not into the gall-bladder.

In this case practice would seem to be at variance with theory.

CHOLEDOCHOTOMY; CHOLEDOCHOLITHECTOMY.

To perform the operation of choledochotomy it is necessary that one should be certain of the position of the duct as compared with its surroundings. The portal vein lies behind, and the hepatic artery lies behind and to the inner side of the common bile-duct. The hepatic duct formed by the union of the right and the left branch is nearly two inches in length; the common bile-duct is nearly three inches in length. This gives five inches of a duct in which a gall-stone may be impacted. Incision into the cystic duct entails no danger to the blood-vessels above mentioned. Incision into the common duct entails less danger to these vessels than incision into the hepatic

duct itself. *If, however, the duct is made tense by the first and middle finger of the left hand passed beneath it, so tense that the stone is made to bulge out and render tense the anterior wall of the duct, a small incision can be made directly over the stone without danger.* A large stone can be easily removed through a small incision by means of a small scoop. I use for this purpose a scoop similar to that used for the removal of wax from the ear. I feel a greater anxiety from the dense adhesions than I do from the direct incision into the common or hepatic ducts. In disturbing these adhesions one is liable to open some large vessel. When the duct is once isolated it can be easily opened. One should always endeavor to incise the duct to the right of its median line. I will in future use the purse-string or running suture of fine silk for the purpose of closing in the edges of the incision after the removal of the stone. This prevents, to a very large extent, the leakage of bile through the opening during the subsequent manipulations. As soon as the stone is removed the purse-string suture is at once tied, and then the peritoneal edges are brought into accurate approximation by a second row of sutures of fine silk.

In my first case I opened the duodenum to ascertain the exact position of the duct. There were three stones in the duct and they were small; the parts were all matted together by dense adhesions. Before drawing the purse-string suture, after the removal of the stone, a probe should be passed into the duct in each direction upward towards the liver, and downward towards the duodenum to insure its patency. It will frequently happen that the stones will slide up and down in a dilatation of the duct; such dilatations may be an inch or two in length. The operator may be deluded by this into the belief that a little force will press the stone on into the intestine. It is dangerous to apply such force. After the stone has been removed and the duct closed, a drainage-tube should be inserted; whether this tube should be inserted from the front or from the loin must be decided by future experience. It is not necessary to leave the tube longer than twenty-four hours if there is no escape of bile. In my second case the gall-bladder was already attached to the abdominal wall, and even after the removal of the stone from the common duct a large quantity of bile escaped through this old channel, the old fistula gradually closed up, and all the bile found its way into the intestine.

For the performance of these operations the operator must provide himself with curved needles. I have had a number of milliner's needles sharply curved for the purpose of suturing intestines. These are very useful in operations on the gall-ducts. The eye of the needle and the largest part of the shaft are of the same size; there is no cutting edge. It may be necessary in some cases to differentiate between a stone in the common duct and a new growth. In a case of this kind I used a fine milliner's needle as an exploring needle and passed it into the enlargement through the wall of the common duct. No grating was felt, and I decided that the enlargement was a neoplasm, and refrained from making any incision into the common duct. I then performed gastro-intestinal anastomosis by means of the elastic ligature; the wound healed behind the elastic ligature and the operation was not a success. I showed the growth at the meeting of the American Association of Obstetricians and Gynecologists in St. Louis. The complete history of the case can be found in the *Transactions* of that association for 1893. The growth was very small, about the size of a hazel-nut. The patient died some weeks after from hemorrhage from the gall-bladder due to rupture of a vessel in the neighborhood of the growth.

In my second operation on the common gall-duct I again used the needle, and, as it grated, I incised the duct and removed three stones. Such needling can do no harm; one must be careful not to push the needle through the duct into the blood-vessels beneath.

When a stone is found in the common duct, operators will ask themselves the question, "Will I perform the operation of cholecystenterostomy, cholecystostomy, choledocholithectomy, or choledocholithotripsy?" Except in very rare cases, I believe the operation of choledocholithectomy to be the proper procedure. The exceptions will be cases in which the adhesions are so dense that it is impossible to isolate the ducts. In some cases the ducts above an obstruction will be found enormously distended and the walls unhealthy and friable.

CHOLEDOCHECTOMY.

The operation of choledochectomy, or excision of the duct, may be required in some cases of external fistula in which the fistulous opening cannot be closed. Under such circumstances the duct may be excised and cholecystenterostomy performed. The bile is then

carried down through the hepatic and cystic ducts, through the gall-bladder, and into the intestine.

It may be found advisable in the future to tie off the common duct after the operation of choledocholithectomy in order to prevent an extravasation of bile. In this way it may be possible to occlude a duct that is too friable to hold accurately placed sutures. For the purpose of tying off the duct, ligatures must be passed around it by means of a plain aneurism-needle passed from within outward. In such a case the operation of cholecystenterostomy or cholecystostomy must be performed to allow the bile to escape. By a ligature placed on the bile-ducts the mucous surface should be as permanently occluded as is the mucous surface of the Fallopian tube.

CHOLEDOCHOLITHOTRITY.

The crushing of a gall-stone in the duct is an operation that does not commend itself to me. These stones, after they have been impacted for a short time, become soft and honey-combed; in this condition it is difficult to crush them. Padded forceps have been recommended for carrying out this procedure. I would rather employ direct incision. A large amount of force must be required in some cases to accomplish the result desired. Stricture of the duct is liable to occur after such severe bruising. Needling of the stone for the purpose of breaking it up into small particles has been advocated by some authors.

RESULTS.

Mayo Robson calculates that, excluding cases of malignant disease associated with jaundice, the all-round mortality for operations for the removal of gall-stones should not exceed five per cent. The causes of death are various. In some cases the patients are unrelieved, and they die as a consequence of the disease itself. In other cases death may occur as a consequence of shock; this is liable to follow operations on patients profoundly jaundiced and weakened by a long illness. In other cases extravasation of bile may take place into the peritoneal cavity and produce a fatal peritonitis. One is certainly not anxious to have any leakage of bile into the abdominal cavity, but there are many cases on record in which recovery has taken place after this leakage had occurred. Enough bile has, in some cases, been poured into the peritoneum to produce a spurious ascites. Two cases are recorded by Morison, observed by him-

self, in which bile escaped in large quantities into the peritoneal cavity after operation. In each case there were signs of a collection of fluid after some days. In each an incision was made above the pubes and several quarts of fluid, deeply bile-stained, were allowed to escape and a drainage-tube inserted. Each of the patients recovered.

In one of the cases on which I operated bile leaked out through the drainage-tube placed over the sutured common duct; the duct was apparently tight when the operation was completed. I elevated the foot of the bed to prevent the escape of bile out of the post-hepatic pouch to which I have previously alluded. Other cases have proved fatal as a consequence of the use of mechanical devices.

In one case operated on in this city a Murphy button was used to produce a cholecystenterostomy, but the gall-bladder and intestine did not unite and leakage occurred, and the button remained in the gall-bladder. In an experiment performed by Reed on a dog the button remained in the gall-bladder and did not pass into the intestine. Be that as it may, the button is the best mechanical contrivance that has yet been offered to the profession for the purpose of establishing an opening between the gall-bladder and intestine. Murphy states that he himself has never had a death after the operation of cholecystenterostomy performed by means of his button. Whether others will be able to obtain such results by its aid remains to be seen. He gives the relative mortality of these operations as follows: cholecystotomy at one sitting by means of suture, thirty per cent. terminated fatally; cholecystostomy at one sitting, nineteen per cent. terminated fatally; cholecystendysis, twenty-three per cent. terminated fatally; cholecystectomy, seventeen per cent. terminated fatally; cholecystostomy at two sittings, ten per cent. terminated fatally. These statistics are being improved every year.

RECURRENCE.

From the fact that such a large number of stones are being found from time to time in the gall-bladder (numbers ranging between one hundred and fifty and three hundred), the question of their recurrence after removal must be taken into consideration. Such recurrence must necessarily influence us in the selection of an operation. The question will arise, Is it better that a gall-bladder should be present to catch stones that come down in the future, or is it better

that there should be no gall-bladder to catch these stones? Under such circumstances, is the patient safer with or without a gall-bladder? This must be an important consideration when discussing the operation of cholecystotomy and cholecystectomy.

NOTE ON THE PATHOLOGY OF GALL-STONES.

The experiments of Mayer, of Carlsbad, are very interesting. He performed four experiments. In the first he placed an unpolished ivory ball in the gall-bladder of a dog; the dog was killed a year after the operation. The gall-bladder was then healthy; the ivory ball was covered with a friable pigmented layer about three-quarters of a millimetre in thickness, without any crystalline structure, containing no cholesterine and but little carbonate of lime. In the second experiment the balls were of terra-cotta and hollow; the dog was killed a year after the operation. The bile appeared thickened, and near the two balls was a friable pigmented concretion about the size of a millet-seed. The hollow of the balls was filled with slimy material, and they were found to contain non-pathogenic bacilli. The few cholesterine crystals were found in the thin pigmented deposit on the balls. The gall-bladder was free from adhesions, and its mucous membrane healthy. In the third experiment two lumps of agar-agar were introduced similarly. After a year the gall-bladder was found adherent to the neighboring parts of the liver; its contents were normal, the mucous membrane healthy. No remnant of the agar-agar was found. Thus, no true calculi were formed in any of the cases. In a fourth experiment a pure culture of bacterium coli was introduced into the gall-bladder of a dog as well as a terra-cotta ball. The animal died three days after the operation with suppuration of the wound, and no concretion was found in the gall-bladder.

Gall-stones are composed of cholesterin and bilirubin calcium carbonate, which, according to Professor Naunyn, may be called "bilirubin chalk." There is about two and one-half per cent. of cholesterine in the bile; the proportion of chalk in the bile is very constant. Gall-stones are more common in women than in men, rare before the thirtieth year, and occur in about the proportion of twenty-five per cent. in those who have attained the age of sixty.

ACUTE OSTEOMYELITIS IN YOUNG CHILDREN.

TWO CLINICAL LECTURES DELIVERED AT TUFT'S COLLEGE MEDICAL SCHOOL.

BY CHARLES GREENE CUMSTON, B.M.S., M.D.,

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LECTURE I.

GENTLEMEN,—The infectious nature of osteomyelitis appears to have been foreseen by Gosselin and Lücke, who say that the action of cold can only be explained by a disturbance produced in the circulation, which thus prepares the *soil* for the development of bacteria which circulate in the blood. Kocher and Rossenbach confirmed this theory by their experiments, and they demonstrated that mechanical or chemical irritation cannot produce this affection when asepsis is well carried out.

To-day we know to what infectious agents this disease is due, and we also know the manner in which they penetrate the bones. It is necessary either that some mode of entrance be furnished or that some media favorable to the growth of the organism is present. Lannelongue says that in nearly all cases, by carefully questioning the parents and thoroughly examining the patient, it was found that some solution of continuity has existed either in the skin or mucous membrane some time before the disease made its appearance.

The entrances offered to the organism, especially in young children and the newly-born, are numerous, and often are very different from those which exist in older children. I will only mention the various traumatisms to which they are subject because these are very common. But the child may have been contaminated *before* its

birth, and in such instances it is the placenta which allows the bacteria contained in the maternal blood to pass into the organism of the child. As an example I would cite Lebedeff's case of a premature labor occurring eight days after the mother had recovered from an attack of erysipelas; the child only lived ten minutes. He found streptococci in the umbilical cord and in the lymphatic vessels of the baby. Senn mentions another case in which a healthy mother gave birth to a child presenting a suppurating osteomyelitis, and says that the infection probably came from the mother, and that the organism entered the body of the infant through the placenta.

The child may also be infected at the time of birth while going through the utero-vaginal canal, and three cases reported by Dardenne appear to prove this. In one of these cases a child of seven weeks presented, after having had foci of suppuration in the feet, an enormous abscess, which, after being opened, disclosed a sequestrum and the presence of an osteomyelitis of the sacrum, due to the streptococcus. The mother of this child had symptoms of pelvic peritonitis a week before the labor and purulent lochia was present seven weeks afterwards. In another case, that of a little girl of eighteen days presenting an osteomyelitis of the tibia, the mother had chills and sharp pains in the abdomen two or three days after the confinement and the lochia lasted for over a month. The third case was a child of two and one-half months, who had been sickly from birth and had had considerable swelling of both elbows for more than six weeks. Since labor the mother suffered from abdominal pains and leucorrhœa.

Now, gentlemen, if you will reflect that puerperal infection is due to the streptococcus, and that this microbe remains in the organism for a fortnight, and sometimes even three weeks, without giving rise to any manifestation, you can easily see that a foetus may be inoculated at birth, the more easily because the skin is often wounded, especially in a difficult labor necessitating any obstetrical interference. The erosions produced by the hands of the operator during version and the wounds following the application of the forceps form excellent means of entrance for the microbes.

Later on, when the child is several days old, the falling off of the cord gives rise to a wound through which the pathogenic organism may enter. Not only does it find an entrance, but also an excellent culture medium in the clot which forms at birth. This means of

entrance is by far the most frequent, as is proved by the published cases.

At a more advanced age we find pathological lesions, which are more especially found in infancy than during adolescence, and which, by removing the epithelial covering of the skin or the mucous membranes, give passage to the micro-organisms; such, for example, are aphthæ, mucous patches, and all the lesions of syphilis and impetigo. The mucous membrane of the digestive tract itself, especially that covering the gums at the time of the first dentition, offers an opening to the organisms which are contained in such large quantities in the saliva. When the microbe has entered under the epithelium of the mucous membrane or the skin, it is necessary that it should find a medium which will carry it to the bone, and this medium is the blood and lymph.

You must not think, however, gentlemen, that every organism penetrates indifferently by one or the other of these media. Each one of them has a favorite or special route. The staphylococcus never penetrates by way of the lymphatics, because its virulence and life would be too rapidly destroyed. In order to produce its pathological effects it must enter through the blood. Mirowitch, who has studied this microbe in the organism, says that if an intravenous injection of the staphylococcus is made in an animal the larger portion of the organisms will have disappeared in the blood during the first hour. During the first twenty-four hours they are found in all the organs, and are more numerous in the liver, kidneys, spleen, and lungs, and it is at this time that they penetrate into the bone. Later on, they disappear from all the organs excepting the kidneys and lungs, and this explains the reason why patients suffering from an osteomyelitis often present pneumonia, broncho-pneumonia, or nephritis. A point to be noted is that Orloff has remarked that this organism never produces disturbances in the digestive organs either in the normal or the diseased state.

On the contrary, the streptococcus nearly always enters the organism by the lymphatics, and you will often meet with cases in which an osteomyelitis is produced by this microbe, giving rise to an erysipelas or a lymphangitis at the point of inoculation, usually the umbilicus. It is one of the microbes that the child usually gets from its mother, as I have already explained. It may, however,

enter by the blood-vessels, and it was in the veins that Koplick and Van Arsdale made their experimental injections.

The pneumococcus usually comes from the lungs, but it may produce a disease of the bone without having attacked the lung, a case of this kind having been reported by Lannelongue and Achard. Eberth's bacillus, on the other hand, always comes from the intestine, and never gives rise to an osteomyelitis without having first produced a typhoid fever in the subject. The diseases of the bones due to this microbe appear to be more or less rare in young children, and I only know of one reported case. This is without doubt on account of the fact that this organism never gives rise to any manifestation in another part of the body unless it has first produced a typhoid fever, and also because it may remain for a long time in the organism after the patient is well from the intestinal manifestations and produce its ravages some time later. Orloff mentions a case in which this organism remained in a latent state for two years when, following a traumatism, it showed its presence by an osteomyelitis.

In order to have an osteomyelitis, the presence in the bone of some micro-organism is absolutely necessary, and sometimes in young children it alone may be the cause. But usually it is aided by accessory causes, which prepare the soil for the germs to go through their evolution. We do not find in all cases occurring in young children the same etiology as that found in adolescents. Fatigue and overwork cannot be a cause in young children or the newly-born, but, on the other hand, there are causes which are only found later or are only discovered infrequently. You all know how children are exposed to chilling of the body and how sensitive they are to cold. You also know how difficult it is to prevent them from soiling themselves and to keep them in a cleanly condition. Poor or insufficient food contributes greatly to predispose them to infectious diseases by weakening them and producing rebellious diarrhoea. Exfoliation of the intestinal epidermis also occurs, and we know that microbes may pass through the walls of the intestine and thus produce an infection either general or local. Kocher and Rosenbach chose the intestine when they gave putrid matters to animals for absorption.

Certain acute diseases, such as scarlet fever or measles, favor the development of micro-organisms. General diseases, such as scrofula and syphilis, also largely contribute to infection. They

provide points of entrance by their superficial lesions as well as by the debility that they produce in children who are affected by either of them. In a case reported by Cottin the influence of scrofula was so clear that an osteomyelitis was taken, during the life of the child, for a *spina ventosa*.

Besides these cases we hear of those in which the subjects attacked are in good health and without any hereditary disease, and here age is the only thing that can be brought forward as a cause. This last condition is of capital importance, all others being, so to speak, subordinated to it. This importance is due to the activity of which the bones are the seat during early life as well as to their constitution, and this brings me to consider briefly the histology of the bones at birth.

You all know that the diaphysis of the long bones, for example, is already formed by a cylinder of bony tissue enveloped by the periosteum and hollowed out in the middle by the medullary canal. All the elements which compose it are bathed in the bone marrow which is found in the central canal, in the Haversian canals, and under the periosteum. The marrow and periosteum are at this time very vascular. The epiphyses only possess a few points of ossification, being made up almost entirely of cartilage. The diaphysis and epiphysis are not in immediate contact, but are separated in children by two layers of tissue which it is important to know,—namely, the bulb and the cartilage of conjunction. The bulb of the bone is made up by a plug of spongy and very vascular substance. The blood comes here in great quantity, but as the capillary net-work covers a great deal of surface the circulation is slow. This slowness is still more accentuated by the ending of the newly-formed capillaries in cul-de-sacs. You will easily understand that this is the starting-point of osteomyelitis because the microbes circulate there in great numbers, and on account of the slowness of the circulation have plenty of time to leave the blood and enter into the tissues of the bone.

The cartilage of conjunction, which is the essentially active part of the bone and situated between the bulb and the epiphysis, is not very vascular, and is hardly traversed by the capillaries which unite the spongy tissue of the diaphysis to the foci of ossification in the epiphyses. These vessels usually unite two by two in the same canal and are surrounded by a sheath of loose connective tissues. Some of them may leave the bony points contained in the epiphysis and go as far as the articular cartilage.

In considering the pathological anatomy of osteomyelitis I may say in beginning that the lesions are exactly the same at all ages, and I would particularly insist that the complications which accompany this affection in infancy are more frequent the younger the child, and always render the prognosis more serious.

Since the writings of Lannelongue we know that the primary lesions of osteomyelitis are seated in the marrow of the bulb, and I have shown you the anatomical reasons explaining this localization. For in the same bone it is nearly always the same extremity which is attacked; of the humerus it is the upper end, while it is the lower end of the radius. Again, the lower end of the femur and the upper end of the tibia are usually attacked, depending on the greater activity and richer vascular supply of those parts.

As soon as the inflammatory process has commenced the entire bone marrow is rapidly invaded. In the first place it is the seat of an extensive cellular proliferation, which increases its size and consistency. It then soon softens by the disintegration of the cells, drops of oily pus form, and the red blood-corpuscles which have come from the ruptured capillaries give a more or less deep red color to the parts according to the number of corpuscles present.

The bony tissue is only secondarily attacked. The lamellæ which make up the Haversian canals are invaded by a process of rarefying osteitis, which produces irregularities and perforations of the bone. The periosteum, which is infiltrated, becomes thickened, while the cellular hyperplasia which takes place in its deep layers, as well as the proliferation in the subperiosteal layer, detaches it from the bone to a more or less considerable extent. It is rarely entirely detached, and usually remains adherent to the diaphysis at the crests of the bone and insertions of the muscles. When these attachments are destroyed a subperiosteal abscess completely surrounds the bone like a cuff. At the limits of the abscess the irritation of the cells of the deep layer of the periosteum produces the formation of a wall formed by bone-tissue which completely closes the purulent cavity.

In young children it may happen that, the periosteum being very vascular, the inflammation extends to the external layer of its cells. Adhesions then occur with the neighboring cellular tissue. Sometimes the periosteum is perforated, and then the pus flows out and invades the soft tissues in the neighborhood and gives place to the variety of osteomyelitis known by the name of deep phlegmon. At

other times, but less frequently, the suppuration is circumscribed and has a tendency to become encysted, and then we have what is known as an abscess of the bone formed during the acute period.

Now let us consider the complications which arise in osteomyelitis in young children, and I will begin by those which are the most frequently met with,—namely, abscess and detachment of the epiphyses. These are met with in more than fifty per cent. of the cases and are often multiple. Chassaignac thought that suppuration usually extended towards the diaphysis. This is true in older children, but in young subjects it has been demonstrated by Lannelongue and Macnamara that the inflammation has a great tendency to invade the entire extent of the bone on account of its activity of development. Often you will find cases in which the abscess located in the epiphysis is larger than that found in the diaphysis. These abscesses and detachments occur in the following manner:

The pus which has formed in the marrow of the diaphysis extends directly towards the epiphysis in the majority of cases. It is true that there it meets with the cartilage of conjunction which acts as a barrier, but it is not long before this becomes infiltrated, softens and then perforates. It is rarely destroyed entirely, at least not in the beginning, but presents canals, more or less extensive holes, which allow the suppuration to continue and the pus to extend above it. If the primary collection continues to develop, the latter is then situated between two purulent foci, both of which aid in its destruction. But even if there were only one focus either above or below it, it could not resist for any length of time in young children. Still united to the periosteum by its borders it soon becomes free and is bathed in pus.

This mechanism is certainly the most common, but cases have been reported which show that detachment and abscess of the epiphysis may be produced in another way. In a case reported by Petit the upper epiphysis of the left tibia in a child of eighteen months was the seat of suppuration while the cartilage of conjunction was still intact. In order to explain this, you will remember that the vascularization of the extremities of the bones in young children is particularly marked by the vessel uniting the bulb to the bony points in the epiphysis, and I told you in the beginning of this lecture that these vessels were surrounded by a loose cellular tissue, and you can easily see that the pus may follow this tract and

attack the epiphysis directly without touching the cartilage of conjunction.

In the first case when the pus perforates the cartilage it is the under surface of the latter which is first attacked, while in the second it is the upper surface. These same reasons explain the error made by certain English surgeons, who believe that the epiphysis is the starting-point of the lesions. Without doubt, in early life epiphysitis is more common than in adolescence, but the lesions always commence in the bulb, and if in young children the epiphysis is so early and so often attacked that it can be explained by this peculiarity of vascularization.

Not only does detachment of the epiphysis often occur in children, but it is also often multiple in the same subject, as is also osteomyelitis. Bipolar osteitis is also met with in adolescents, but these cases are relatively infrequent, and generally only one bone is the seat of disease. Now, in young children multiple foci are frequent. In one case reported seven detachments occurred, while in another there were six. They are all the more numerous the younger the child.

The bones the most frequently attacked are, in the first place, the femur and tibia; then come by order of frequency the radius, ulna, the bones of the metacarpus, the sacrum, and ischium.

As I have already said, these complications always increase the gravity of the prognosis because the surface of absorption that they create is very large, but it is especially the future of the child which is grave, if it lives, on account of the shortening of the limbs that this disease may produce.

Shortening may occur in three ways. The first usually occurs in the following manner: the inflammation sets up a superactivity in the cartilage of conjunction and produces the formation of a layer of bone which binds the epiphysis to the diaphysis, and thus the cartilage of ossification loses its function. And as we know that the extremities of the most active bones are the most often the seat of this disease, you can easily imagine what a disproportion may exist between the homologous segments of a limb.

The second cause of shortening is more infrequent. Under the influence of the irritation of which they are the seat the cells of the cartilage of conjunction proliferate and return to the embryonic state. The fundamental substance softens, and for a certain time

the diaphysis is united to the epiphysis by a soft and only slightly resisting tissue, which easily gives way to the tractions that are exercised by the muscles on their point of insertion. Angles and curves are formed, always the same for the same bone, which are especially remarked at the lower end of the femur and the upper end of the tibia. The bone preserves the same length, but by the curves in it the limb is shortened.

The third cause is the result of a bad juxtaposition of the fragment. The detachment of the epiphysis is always seated very near the joint and immobility is very difficult to secure. Consequently it may happen that instead of taking their former position the fragments become united by their borders, and it results that the axis of the epiphysis and that of the diaphysis are no longer on the same line.

In the segments of a member made up of two bones, if one of the latter alone is affected, the second, by continuing to grow, will provoke more or less accentuated deviations which can only be remedied by a resection.

Elongation appears to be more infrequent. In order that this shall occur the cartilage of conjunction must simply be irritated, but we know that in children detachment of the epiphysis is frequent, and the cartilage dipping into a collection of purulent liquid cannot resist it. One case is, however, reported in which the femur of a child of two years became elongated to the extent of three centimetres, but in this case the osteomyelitis had lasted for over a year and no detachment of the epiphysis had occurred; consequently the cartilage, instead of being destroyed, was simply irritated by a slight suppuration, the latter being kept up by a sequestrum in the diaphysis.

I have told you that suppuration could extend to the epiphysis by perforating the cartilage of conjunction or by following the vessels uniting the bulb to the points of ossification in the epiphysis. When it takes one or the other of these roads, and when it has commenced to attack the epiphysis, it rapidly invades the latter in totality. The cellular elements are destroyed first, and soon the fundamental substance itself becomes rarefied and cavities are formed, while the suppuration may even extend to the diarthrodial cartilage, perforate it, and the pus will then empty into the joint.

In this case you will have all the symptoms of a suppurating arthritis.

Lesions in the joint are not rare. In children they are the most frequent complications after detachment of the epiphysis. The age of the patient has also a great influence in their production, but just the reverse to what occurs in detachment of the epiphysis, in that the newly-born appear to be less frequently attacked than older children. Nevertheless, if they are infrequently met with in very young subjects, they are very often multiple when they do occur. The case of a child aged fifteen days is reported in which three joints were diseased at the same time, while in another case, a child aged nine days, every one of its joints was diseased.

The pus usually extends, as I have already said, through the epiphysis, but it is sometimes a subperiosteal abscess, and more infrequently a layer extending in the cellular tissue of the limb which opens into an eroded synovial membrane.

For the elbow and hip the invasion may have an entirely different origin, because the cartilage of conjunction is intra-articular,—that is to say, contained in the synovial cavity. If a detachment of the epiphysis occurs, the pus falls immediately into the joint and symptoms of an arthritis appear. The lesions found in these forms of arthritis are the same as those found in all cases of suppurating arthritis, consequently I will not dwell upon them at present.

Besides these very common complications other more infrequent but very interesting ones are observed; I wish to speak of necrosis, fractures of the diaphysis, and hyperostosis, all of which I will now describe.

The bone being partly deprived of its nourishment by the destruction of the marrow, again finds its nutrition compromised by a condensing osteitis of which it is the seat. In young children it appears rarely to attack the entire diaphysis, and I only know of one case, reported by Ollier, of a little girl aged eight days, who had an osteomyelitis which necessitated several incisions. The diaphysis of the radius was in a state of necrosis, but only projected outward a few months later, and Ollier was not sure that the necrosis was total, because the ends of the sequestrum were not united like those of a bone which had been separated from the cartilage by maceration; they were deeply notched, especially at the lower end.

Sequestra comprising part of the diaphysis appear to be less in-

frequent, and may remain several months in the bone after the general symptoms have disappeared. Occasionally they keep up a slight but continuous suppuration, which produces fistulæ, the latter being generally single, but two may be met with.

But of all forms of necrosis the one most frequently met with in young children is that one which only occurs in fine lamellæ. It gives rise to the formation of small bony needles, which become free in the medullary cavity, whence the formation of small needles of the spongy tissue of the epiphysis. This form of necrosis never gives rise to fistulæ.

In contrast to detachment of the epiphysis in young children, necrosis probably never attacks several bones at the same time, and consequently is not very serious. The lesions are usually superficial and are quicker repaired by the regenerating activity of the bones at this age. It is only disagreeable on account of the accidents that it may cause, such as suppuration of long duration and spontaneous fracture of the diaphysis.

In these cases fractures are infrequent, but when they occur they are produced by necrosis, and are nearly always produced by muscular contraction, because traumatism is infrequent in very young children. Sometimes it is the necrosed part itself which is the seat of the fracture, while at others it is the remaining healthy tissue, which is thinned by the perforations and ulcerations of rarefying osteitis. The line of fracture is usually irregular, and the only danger is the production of a septicæmia, of which they may be the cause, because otherwise they always undergo a rapid consolidation.

It may happen that in the neighborhood of the abscess the deep cellular tissue of the irritated periosteum may more actively proliferate, and then you will observe hyperostoses, which are very frequent complications in older children but are more infrequent in young subjects. These hyperostoses never produce a deviation of the limb or a functional impotency, and consequently the prognosis is favorable.

Visceral complications and distant foci of suppuration may also occur. The first are quite frequently met with in young children, and of all the organs the lungs appear to be the most frequently attacked. You may have metastatic abscess or congestion; more often you will find bronchitis, pneumonia, or broncho-pneumonia. In the digestive tract diarrhœa is often met with, either at the beginning

of or during the disease. A case is reported in which foci of suppuration were found in the liver in a child of twenty days. The foci existed on the upper and under aspects of the organ very near the gall-bladder, and were made up of a purulent matter situated immediately underneath Glisson's capsule.

The kidneys are also often infected and nephritis often occurs. The pericardium may also be the seat of suppuration.

As you can readily imagine, these various visceral complications increase the gravity of the prognosis, and death occurs in all cases in which an important organ has been involved.

Distant and superficial suppuration is still more frequent than the visceral complications, and in the first place comes mastitis in little girls. In one case both breasts were the seat of this complication. They get well if they are incised early.

Suppuration of the ear appears to be about as frequent as that of the breast. You may also meet with abscess of the hands, feet, shoulder, or even of the thyroid gland, but such cases are rare. These secondary foci always develop during the disease, and are in all probability produced by microbic emboli.

Gangrenous ulcerations are less rare; they are superficial, and are to be found on the limb which is the seat of the osteomyelitis. Sometimes they may be found around the vulva or anus even when the focus of suppuration in the bone be that of the metacarpus. In none of these cases can the cause of this gangrene be made out.

The large variety of lesions that I have mentioned will show you that, at least in young children, osteomyelitis is only the manifestation in the bone of a general infection which may invade all the organs. We know that the primary seat is not always in the bone itself, and that often the skeleton is the seat of the disease in several points at one time. Without doubt this infection is less serious when it remains localized in the bone, and the number of recoveries is far greater here than when there are symptoms of general infection. But when an osteomyelitis appears the entire organism is infected and is invaded by the micro-organism.

Gynæcology and Obstetrics.

FIBROID OF UTERUS; RETROVERSION AND LACERATED CERVIX; STERILITY FROM ENDOMETRITIS AND SALPINGITIS; CATARRHAL SALPINGITIS, ENDOMETRITIS, AND VULVO-VAGINITIS; POSSIBLE GONORRHOEA.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC.

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FIBROID OF THE UTERUS.

GENTLEMEN,—This patient is thirty years of age; has been married twelve years, and has had six children, the last eight months ago. She is now nursing. She was unwell about three weeks ago. At present she complains of a good deal of pain in the back and right side of the abdomen, principally since the birth of the child. This patient came to me first some three weeks ago, and I found a condition which induced me to tell her that she should be kept under observation for several months. My reason for telling her this was that, on examination, I felt not only a lacerated cervix of the third degree, which was probably of no consequence in this case, but I found, on investigating the cause of pain on the right side, a large and more or less distinct mass, which was apparently firmly connected with the uterus, and not very movable except with this organ. It felt either like a multilocular ovarian tumor, which is often quite hard, or else like one of those growths springing from the uterus, known as fibromyoma. The latter are composed partly of fibrous and partly of muscular tissue, are not very hard growths like the fibromata, nor very soft ones like the myomata, but a combination of the two. But the patient is nursing, and has not been unwell for three weeks, or just before I saw her. The semi-elastic

feel of this tumor, its anatomical relation to the uterus, the fact that it gives rise to pain, and the possibility that this woman might have a foetus in the other half of a bicornute uterus, made me tell her that she should be kept under observation until I could see whether the tumor was growing or diminishing as a myoma should do. The delivery of a full-term foetus from one half would not necessarily cause a miscarriage from the other, and therefore the uterus might continue to increase in size. In this case, however, the child was born eight months ago, and the size of the right half of the uterus does not correspond with an eight months' pregnancy. The size of the tumor on the right side would not indicate more than a four months' pregnancy. The possibility of such a condition occurred to me because about two years ago a patient was brought into the hospital with a diagnosis of extrauterine pregnancy of four months. She had a great deal of pain in the right side, and the tumor was found to correspond almost identically with the tumor in this case, both in size, hardness, and tenderness. I thought there was no question about the existence of extrauterine pregnancy, as she had skipped four menstrual periods, and had nausea and other signs of pregnancy. The sound passed in three inches, but it did not go up into the tumor, and hence indicated not a uterine but an extrauterine pregnancy. I thought it a tubal pregnancy very closely connected with the body of the uterus. She had much intermittent and severe pain. I performed a laparotomy, and on exposing the uterus and passing my hand into the abdominal cavity, I was very much surprised to find that a peculiar projecting tumor springing from the right side of the uterine body was no longer to be clearly felt. The uterus was of uniform size and had a very broad fundus. I told my assistant to pass the sound into the uterus, and it passed to the left just as I passed it; but on again introducing it more towards the right, it went in a long distance, and the diagnosis was at once plain,—it was a bicornute uterus. It was very fortunate that I had not cut into the uterus, emptied its cavity, and extracted the foetus, as I had at first intended to do. Before sounding, however, I had aspirated and found amniotic fluid, and on bringing the whole tumor out of the abdominal cavity the true nature of the case became apparent. Of course the woman should have been left alone. She had had one child already, and the cervix was torn on the left side. Having removed the amniotic fluid, I knew abortion would occur.

There was a slight rent in the peritoneum from catching it with vulsellum forceps before the diagnosis was established; so I sewed this with catgut, and when the bleeding had entirely stopped, returned it to the abdomen, and sewed up the abdomen. She aborted that night, and made a perfectly uneventful recovery. This was the first time I had been misled in this way, and the case closely resembled the one now before us, only that this woman gives no signs of pregnancy. I have no question in my own mind that it is a fibroid springing from the wall of the uterus, being partly subperitoneal and partly interstitial. Usually fibroids do not cause pain, and after confinement diminish in size, sometimes disappearing entirely during the natural process of involution. This is not the case here, because eight months have already elapsed, and the tumor is quite large. The sound shows the uterus to be only three inches in depth. The case is also interesting on account of the coexistence of pregnancy and a fibroid or myomatous growth in the uterus. I have seen a number of such cases, where either interstitial, subperitoneal, or pediculated fibroids, hanging more or less loosely from the body of the uterus, have been present in cases of pregnancy going on to full term, the fibroid increasing very rapidly in size in consequence of the natural increase of the uterus. Labor may go on without any interruption, and the patient make a perfectly normal recovery, the fibroid diminishing greatly in size, or even entirely disappearing. Occasionally you will meet with cases where a myoma, usually an interstitial one, impinges more or less on the uterine cavity, causing uterine contractions, and, of course, either abortion or premature labor. If the fibroid or myoma should be submucous, and impinge directly upon the cavity of the uterus, the chances are that the woman would abort anyway, because such tumors give rise to bleeding. In fact, one of their prominent symptoms is menorrhagia. If a woman should become pregnant with a tumor situated in this way, she would probably miscarry very early. This is not invariably the case, however, for women have sometimes gone on to full term, and the tumor has sloughed away as the result of the uterine contractions and the pressure of the child, the tumor coming away after the delivery of the child and after-birth, much to the surprise of the attending physician.

There is one danger to fear from interstitial and submucous fibroids if the woman goes to term, particularly if they are situated

near the fundus uteri, and that is post-partum hemorrhage. I have seen several cases of frightful post-partum hemorrhage, where I found, on examining the patient for the first time, a tumor projecting over the site of the placenta. Its presence interfered with the contraction of the uterine body, and the blood-vessels at the placental site were not compressed sufficiently to stop the bleeding. In such cases the best method of treatment is direct bimanual compression, with one hand in the uterus and the other hand on the fundus, together with hypodermics of ergot into the abdominal wall. Of course ice applications may be used later on, and injections of ice-water and vinegar, or hot water and vinegar. The faradic current may also be used. I said either ice-water or hot water and vinegar, because extreme heat and extreme cold act alike in controlling hemorrhage. My preference is usually for ice-cold, for it always has the same temperature, while hot water may be either too hot or not quite hot enough. The hæmostatic effect of heat is, I think, also not so permanent as that of cold.

What shall we do with this woman's tumor? She has pain, but she does not menstruate profusely; and hence there is no need to pay attention to the common symptom of fibroids,—menorrhagia. We cannot, however, do much for her. If she were in good circumstances she would be benefited a good deal, as regards the diminution of pain and reduction of the size of the tumor, by the Apostoli method of galvanism, using the positive pole in the uterus, and the other electrode, consisting of clay, or of a large flat sponge covered with a quilted sand-bag, upon the abdomen. A current of one hundred to two hundred and fifty milliampères for five or ten minutes, two or three times a week, for twenty-five or thirty sittings, would probably yield permanently good results. I have had some excellent results and some most dismal failures by this method of treatment; but this criticism applies to every treatment which is not a specific. This patient's symptoms are not very severe. We shall therefore keep her under observation to watch the growth or diminution of the tumor. The pain can be relieved by local applications like chloroform liniment; but the relief to her mind by telling her that the tumor is of no consequence will do her much more good. She came to me after being told by one of the house-staff of the Woman's Hospital that she had a tumor requiring immediate removal. I think the removal of such a tumor would have been very

difficult; for it would require a large incision going into the capsule of the tumor, which must then be peeled out, and the capsule sewed up. This operation of myomectomy, or enucleation by laparotomy of interstitial fibroid or myomatous growths, is a very successful operation, but is not by any means an easy one, and it should be reserved for cases justifying the employment of severe measures. This patient undoubtedly had the tumor during her last pregnancy, for such fibroids do not usually grow in five or six months. As a general rule, the harder the tumor, and the more subperitoneal, the less likely it is to increase in size.

RETROVERSION AND LACERATED CERVIX.

This next patient is thirty years of age; married, and has had three children, and one miscarriage, ten weeks ago. She flowed for six or seven weeks after this. Now she comes here for pains which she feels all through the lower part of the abdomen, with pain in the back, and "bearing down." The symptoms are those very commonly met with in minor cases of uterine disease, such as chronic endometritis, chronic cervical catarrh, retroversion, and downward displacement, generally with a heavy subinvolted uterus. That peculiar "boiling" sensation which you hear women tell about is really a sensation of heat or throbbing. It is very often due to constipation, and will usually disappear under the administration of cathartics. This woman's cervix presents a very common condition, which sometimes causes no symptoms, while in other cases it produces very severe local and reflex symptoms. On digital examination we find two pathological conditions which partly account for her pains,—viz., a deep bilateral laceration of the cervix extending up very nearly to the vaginal vault, and a retroversion of the uterus between the first and second degrees, the fundus lying down upon the rectum. The external os gapes, and admits the finger to the very depth of the laceration. This second pathological condition will account for her backache. The cervical laceration certainly is large enough to require repair, and the backward displacement ought assuredly to be relieved, and the uterus kept in position by means of a supporter, usually a modification of the Hodge pessary, known as the Albert Smith. The point to be decided before doing this is whether such replacement be possible. To do this, pass your finger into the posterior vaginal vault and ascertain the mobility of the

uterus. If you cannot replace the organ with the patient in the dorsal position, try it with her on the side. Having replaced the uterus manually, insert the pessary. If the uterus be found adherent to the anterior wall of the rectum, as is not infrequently the case, owing to peritoneal adhesions, it may be restored gradually to proper position by the systematic use of tampons for months or by other more rapid and radical means. Here I find the uterus perfectly movable, and I can pass my hand behind the uterus through the abdominal walls, and easily restore the organ to its normal position; hence there is no obstacle to the immediate introduction of a supporter in this case. Now, having replaced the uterus, I can examine the appendages. I find the left ovary quite close to the cervix, but perfectly normal in size and outline. The right ovary is likewise perfectly normal in size,—*i.e.*, about the size of an unshelled almond. This combination of laceration of the cervix with backward displacement of the uterus is met with almost daily. The correlation between the laceration of the cervix and the displacement is not so distant as one might imagine. The first effect of such a laceration upon the uterus, if it be sufficiently extensive, is to interfere with the function of involution, causing the uterus to remain large and heavy and the ligaments to be relaxed. As a result, particularly if the woman be multiparous, so that the pelvic organs have been already relaxed, the heavy uterus will drop back, giving rise to retroversion, and perhaps ultimately becoming a retroflexion. I presume this patient's symptoms will be greatly relieved by lifting up the uterus into position and inserting a supporter. These supporters are unpleasant, but I know of no way in which I can keep a displaced uterus in position and allow the woman to go about her work except by some intravaginal support. Of course it must be properly fitted to each individual case, and must be occasionally examined. They must be worn some months, and in some cases for years; but when properly applied they give very little inconvenience, the patient does not have to see her physician but once every few months, and hence the advantages more than counterbalance the disadvantages and discomfort. There is much said about pessaries being bad instruments. In my experience they do harm because they are not properly applied or properly watched. It takes a great deal of technical skill and some judgment to use them successfully. An ill-fitting pessary is even worse than an ill-fitting shoe.

Placing the patient in the Sims position and examining with the speculum, we find that the laceration seems smaller than it did on digital examination. This is because the parts were in the natural position during the digital examination, but now the speculum pulls the perineum backward, the anterior vaginal wall is pushed forward by the depressor, and the pulling apart in this way of the lips of the cervix makes the laceration appear more shallow. Hence never make a diagnosis of any uterine or cervical pathological condition with a speculum or finger alone. Usually the digital examination should come first.

Now, which condition should be attended to first? If a supporter be introduced, as the woman stands on her feet, the cervix comes down between the bars of the pessary, and causes a steadily increasing eversion of its lips, just as in the speculum examination. If the cervix be first sewed up, it will be one or two months before the pessary can be introduced, because if inserted sooner it will tear apart the freshly united edges of the cervical tear. Usually the symptoms of displacement cause more discomfort to the patient than the lacerated cervix, and on that account I would keep the uterus in position for one or two months by a properly fitting pessary, allowing the patient to go about all the time. Then I would sew up the tear and keep her in bed for about two weeks. The pessary can be introduced at once after the operation, and will not interfere with union so long as the (silver-wire) stitches are not removed; if the latter are left in three or four weeks, the fresh scar will not be torn open by the pessary, which may then be worn for as long a time as seems necessary. This is a novel departure with me in these cases, and I think an improvement on the old plan of letting the uterus become retroverted again before reinserting the pessary.

STERILITY FROM ENDOMETRITIS AND SALPINGITIS.

Our next patient is twenty-seven years old; has been married ten years. She menstruates every three weeks, and the flow, which is normal in amount, lasts six or seven days, and is accompanied by considerable pain. She complains of constant pain in the left ovarian region. There is a profuse yellowish, sticky, vaginal discharge. She desires to know the reason for her sterility. This discharge you see on my finger is such as you would expect to get either from the vagina as a result of subacute catarrh of the vagina, or from

the uterus as a result of a subacute or chronic endometritis. In this case the condition is undoubtedly chronic. If the discharge were from the cervix, it would be thick and stringy and could be drawn out into shreds several inches long; but this peculiar purulent discharge is usually a sign of chronic endometritis, and this is a sufficient cause for her sterility. It is certainly one of the common causes; for the purulent discharge interferes with the life of the spermatozoa, although they may enter the uterus. But this is not all,—the finger detects a nodular irregular cervix with a gaping external os, a very unusual condition for a nulliparous woman. Bimanual examination shows a distinct swelling on the left side larger than an egg,—tubular and freely movable. It is undoubtedly the left tube and ovary considerably distended, probably with fluid. On the right side, the ovary and tube are not enlarged, but are adherent. The uterus is not freely movable, and the attempt to move it causes considerable pain. This is a typical case of chronic endometritis with probably purulent salpingitis on both sides, with enlargement of the left ovary and tube, and adhesions of the right ovary and tube. These conditions are often attributed to gonorrhœa, chiefly of the latent variety, because men with acute gonorrhœa do not usually indulge in sexual intercourse. It has been claimed by Noeggerath and others that a man is never really cured of a gonorrhœa, and always infects sooner or later any woman with whom he may have intercourse. This is true of a certain proportion, but it is not true in my experience for a majority of the cases; for there would not be a healthy woman in the land if such were the case.

This patient may have been infected by her husband, but it is quite as likely that she had originally an acute endometritis from imprudence during menstruation, excessive coition, exposure to cold, or from some traumatism. When the disease is of long standing, as in this case,—four years,—it is of but little importance whether it be caused by gonorrhœa or by the other causes already mentioned.

I do not think much can be done for this woman's sterility. If she had not adherent ovaries and salpingitis we might cure the endometritis, but as it is now, if we adopt *effective* treatment for the endometritis, which is necessarily pretty severe, we shall in all probability only increase the inflammatory condition of the adnexa. By scraping out the uterus with a sharp curette and thoroughly applying a fifty-

per-cent. solution of chloride of zinc to the whole endometrium, and draining with iodoform gauze, and repeating milder applications once in a week or ten days, the endometrium might be restored to a normal condition; but those applications would more than likely excite fresh inflammation of the appendages, and leave her in a worse condition than before. We might try to cure the disease of the appendages by the use of iodine and tampons, hot sitz-baths, etc., but the treatment is exceedingly tedious, and is seldom continued long enough to secure any marked benefit. A private patient who came to me recently with a sharp anteflexion, decided enlargement of the left tube, and with a not very movable uterus, was sterile, and was urgently desirous of having children. Under an anæsthetic I employed the following method, well knowing the risks. A fine probe-pointed knife was passed through the internal os, which was slit in four directions, so as to admit of the passage of a large Peaslee sound. I did not dilate for fear of causing a return of the salpingitis and local peritonitis. After swabbing out the uterine cavity with a solution of equal parts of carbolic acid and glycerin I inserted a stem pessary into the uterus. The stem was removed three times within a fortnight, and the carbolic acid again applied before the reinsertion of the stem. An ice-bag was applied over the abdomen after every such application to avoid the possibility of peritonitis. The patient returned home rather prematurely, but there were no bad effects, and her physician wrote me that she was doing well. It is too early to say whether or not she will conceive. I have seen conception occur, however, when the tubes and ovaries felt more diseased than in the case to which reference has just been made.

CATARRHAL SALPINGITIS, ENDOMETRITIS, AND VULVO-VAGINITIS.

This patient is thirty-two years old, married nine years, has had one child, and a miscarriage one year ago, since which time she has been sick with pain in the back and lower part of the abdomen. Menstruates every four weeks, for five or six days each time, the last menstruation being one week ago.

This woman complains of much pain upon simple digital examination. Before my finger scarcely enters the vagina proper it strikes posteriorly against several irregularities, upon moving which she complains of pain. These rugosities are the transverse folds of

the vagina. On separating the labia for inspection, we see that the mucous membrane is very red, having the appearance commonly seen in acute, subacute, or in bad cases of chronic vaginitis or vulvitis. She has been using douches, and that is probably the reason why there is so little discharge to be seen. There is, however, some yellowish-brown discharge. Judging from these symptoms, I should make a diagnosis in this case of chronic vulvo-vaginitis. She says she came here for several months and improved; but she has stayed away now for six months, and is consequently worse. The mobility of the uterus is slightly limited, and on moving it considerable pain is produced. The uterus is anteflexed in the second degree, the cervix is short and cylindrical, and there is apparently nothing particular the matter with the uterus. Great pain is experienced on touching the appendages on either side, and I have little hesitation in making a diagnosis here from the tenderness of the perimetria, that there is catarrhal inflammation of the tubes, a chronic endometritis, and a resulting chronic vulvitis and vaginitis. It is a common complication either of abortion or a gonorrhoeal infection, or exposure to cold during menstruation or at other times, which may have caused a catarrhal salpingitis and an acute endometritis, which ultimately passed into this chronic condition. These latter conditions are liable to exist just so long as the endometrium and tubes are affected. I made this diagnosis chiefly from the pelvic tenderness, and from the peculiar red and highly sensitive condition of the mucous membrane of the vagina and vulva. A more accurate diagnosis can only be made by examining her with the speculum and seeing whether any discharge issues from the external os, and whether the lips of the cervix are eroded. Even then the discharge might have been removed just before this examination. In this case I will use the cylindrical speculum for examination, because it will show us the condition of the mucous membrane of the vagina progressively, and it will furthermore enable us to apply a solution of nitrate of silver to the vaginal mucous membrane more conveniently than can be done with the Sims speculum. This is about the only class of cases in which I use Ferguson's cylindrical speculum,—i.e., where I wish to apply a fluid to the vaginal canal. If you use the Sims speculum, the posterior vaginal wall is covered by the speculum, and one is liable to make only an imperfect application to this portion of the vagina. Very often you will see the vagina under these circum-

stances dotted over with small red spots, which are in rows, following the line of the folds of the vagina. These are the papillæ of the vagina which have become inflamed and hypertrophied, and the surfaces of which have become abraded by friction of the vaginal walls. When you apply a solution of nitrate of silver, of a strength of twenty or thirty grains to the ounce, which should not be exceeded for application to the vagina, you will find that only the raw places become whitened from the formation of an albuminate of silver upon them. You can tell by this whitening of the surface the extent of the abrasion of the epithelium. You see on wiping the mucous membrane with cotton there is a bloody discharge, which would not be the case if the vagina were normal. Occasionally there is difficulty in getting the cervix to pass into the field of the cylindrical speculum, and in such rare cases the sound may first be passed into the uterus, and then the speculum passed over the sound. Having exposed the cervix, I pour about one drachm of the silver solution into the speculum; then with a cotton swab mop the vaginal mucous membrane thoroughly with the solution at the same time nearly withdrawing the speculum. By tipping the speculum the excess of fluid is allowed to run out; the speculum is then pushed back, and the cotton tampon smeared with vaseline and inserted into the vagina. In this case the vaginal surface has become a uniform white. I also apply a somewhat weaker solution to the vulva. The treatment is finished by introducing a cotton pledget between the labia. The patient is told to remove this cotton pledget the first time she has to pass water, and to remove the cotton from the vagina on the following morning. Then she is to use lukewarm douches containing two to four tablespoonfuls of the liquor plumbi et opii to one pint of water, every three or four hours, according to the intensity of the affection. In the course of three or four days the patient will be greatly improved, and she will then return, and you will repeat the application of nitrate of silver. The vaginal mucous membrane will be found to be much paler. The nitrate of silver application may be weaker this time. Similar home-treatment will be carried on, and three or four days later she will return for another application. After doing this a number of times the mucous membrane will have changed from this bright red color to the normal light pink, and the tenderness will have nearly subsided. Some discharge will probably still persist, but it will be of the ordinary leucorrhœal character,

and the time has arrived for the use of an astringent rather than of a caustic. I formerly used the officinal solution of tannin and glycerin, one to four, but for the last few years I have changed from solutions to dry applications, using for this class of cases a mixture of one part of iodoform to two parts of tannin. This is dusted in, or introduced with a spatula, and a dry tampon inserted. These applications can be repeated every second or third day until the mucous membrane has become perfectly healthy and all tenderness and discharge have disappeared. It will generally take from two to four weeks, more likely the latter time. I have often seen cases which have been told by their physicians that they must be treated every day, but I rarely find cases which warrant such frequent applications. I refer more particularly to intrauterine applications. More than twice a week is not judicious, except in unusual cases like those of hemorrhage from subinvolution following a miscarriage. Under such circumstances a uterine tampon may have to be inserted every day for some time. Of course a tampon may be introduced daily for the cure of leucorrhœa, etc., but it is seldom necessary, as the tampons can be so prepared as to remain aseptic for a longer period; they can be readily left in the vagina from two to four days, and every other day would be sufficiently often to insert them.

POSSIBLE GONORRHOEA.

Our next patient is thirty-eight years of age, has been married a second time, one and a half years ago, has had four children, and menstruated for the last time two months ago. She complains of abdominal pain and frequent and painful micturition. There is also a profuse yellow discharge. She comes with the inquiry as to whether she has had gonorrhœa, as she states that her husband has some sort of a urethral discharge. This question is impossible for us to answer; there is nothing specific about a gonorrhœal discharge so far as the mere appearance and odor are concerned. The only way, so far as I know, in which the diagnosis can be positively made is by finding in the discharge the organism which is considered to be pathognomonic of gonorrhœa,—the gonococcus. To tell a woman she has gonorrhœa simply because she has a yellow, acrid, pungent discharge, would be laying yourselves open to a suit for damages and defamation of character, because you cannot prove it by any such symptoms, and even the existence of the gonococcus in the dis-

charges would not always seem to be sufficient proof. There is nothing about the appearance of this woman's genitals to prove to me that she has any irritation from an infectious discharge. There is a yellowish-white discharge, such as is seen in ordinary leucorrhœa, and of course with the history she gives, that her husband has a urethral discharge, it behooves us to be careful to avoid carrying contagion by means of this discharge on our fingers. Introducing the cylindrical speculum, the external os is seen to be slightly lacerated, but not eroded, and there is absolutely no evidence of anything more than an ordinary leucorrhœal discharge. Her adnexa are apparently normal. The wisest plan for this patient is to use douches containing a tablespoonful of alum to one quart of water.

THE CLINICAL ASPECTS OF TWIN BIRTHS AS BEARING ON MANAGEMENT.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY OF ABERDEEN.

BY WILLIAM STEPHENSON, M.D.,

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GENTLEMEN,—Twin births, as you are aware, are usually easy, and, whilst liable to be tardy, they do not generally give rise to difficulty or anxiety in the course of labor.

This seemingly non-complicated character is, nevertheless, confronted by two very serious facts,—first, that the proportionate number of twin children born dead (exclusive of non-viable and decomposing) has been two and a half times greater than in single births; and secondly, that the death-rate of mothers bearing twins has been fully double that in single pregnancies.

These facts give an importance to a subject that otherwise it would hardly be necessary to discuss by itself. But to have the mortality of both mothers and children more than doubled, under circumstances presenting no greater difficulties than ordinary labor, is not to the credit of obstetrics. It is clearly our duty to inquire whether the increased risks incident to labor in multiple pregnancies cannot be so met by art as to lessen the unfavorable results. *Can it be that the management of labor in twin cases is faulty and based on erroneous ideas?* This question I leave to each one to answer for himself at the end of this lecture.

Now, the prevailing notion underlying the management is, that a confinement with twins may be regarded as two single labors following rapidly upon each other, with a period of dilatation common to both; and that the delivery of each child is to be conducted according to the rules that would apply in the circumstances of each, had they been single. (Spiegelberg.)

These ideas have regulated practice for more than a hundred

years; though venerable as to age, they are nevertheless faulty, and have given a wrong bias to the obstetric mind. It is not the labor but the conception that is twofold. Labor is the process of emptying the uterus, whatever the contents may be, and is not complete until that is accomplished. After the birth of the first child, then, the dominant idea should be, not that the labor is *doubled*, but that it is *incomplete*, with the well-known risks attendant on such a condition. This is a very different and, I hold, more accurate mental conception of the situation, one that may materially change our line of action.

Further, the opinion that what applies to single births is applicable to twins, in the separate circumstances of each, is open to question.

We are taught that if the second child presents by the head, we may patiently wait the return of pains; and again, that the unfavorable results to the second child are owing to the greater frequency of breech and transverse presentations. Such statements are mere surmises, and may not be true. I know of no observations to support them. On the contrary, as I shall show, clinical analysis proves the very opposite to be the case.

In the circumstances of the second child presentations of the head must be looked upon as the most dangerous; that of the breech more favorable; whilst presentations of the feet and transverse presentations are perfectly safe.

If this be true, it is evident that the conditions in twin labors are anomalous, and that it is a mistake to take for granted that what applies to single births will hold equally good with twins. And now for the proof.

There is no lack of statistics of twin births, but they have generally been compiled in so disjointed a manner that they are of no value as guides to treatment. The relative frequency of the various presentations and the number of live and still births are given, but separately one from the other, so that it is impossible, from the numbers, to determine what influence the presentations have had upon the mortality.

Again, the duration of the interval has been noted by some writers, but quite apart from the results to the child. The influence it has on the mortality has never been discussed; and the opinion

that an hour may safely be allowed to intervene is a mere conjecture, based on no analysis of cases.

What is required for our purpose is a record of a sufficiently large number of cases, in which the presentation of each child, the duration of the labor and of the interval, the number of the pregnancy, and the results to mother and child are given for each case. Fortunately, this is to be found in three valuable reports of the Dublin Lying-in Hospital published by Collins, by Hardy and McClintock, and by Johnston and Sinclair. Combined, they embrace the records of five hundred and sixty-eight cases of twin pregnancies; but excluding all children reported as "putrid" and those born of a non-viable age, as is necessary in such an inquiry as this, we have available five hundred and thirty-eight cases in which nearly all the details above mentioned are given in each case.

It may be objected that these statistics are old (1826-1854), and do not represent the practice of to-day. The principles of management were, nevertheless, the same as are still taught in text-books, and the only difference is that practitioners may not now be inclined to wait so long as their fellows did in the earlier years of this century. I may also state that the argument I shall use is based on the successes of certain lines of treatment more than on the failure of others.

The data supplied by the reports I have carefully analyzed,¹ but in this lecture can deal only with the general results. I place in your hands, however, two of the tables, which will enable you to test for yourselves the accuracy of the conclusions. The inquiry embraces some points of interest on which we cannot enter to-day; our attention must be limited to what bears upon the management of the labor after the birth of the first child.

The accepted opinions, as represented in text-books, may be summarized as follows: We are taught that our duty is to wait for the recurrence of pains and the expulsion of the second child by the natural powers. Delay has been represented as rather beneficial than otherwise, by allowing the system time to rally from the fatigue of the first labor before entering on the second, and also by averting the dangers dependent upon an uncontracted uterus, likely to arise

¹ For historical review and statistical analysis, see papers by author "On the Management of Labor in Twin Pregnancies," *Scottish Med. and Surg. Journ.*, vol. i., January, March, and July numbers, 1897.

from too hasty extraction of its contents. Most authors recommend that half an hour should elapse before rupturing the membranes, if still intact, especially when the head is found to present, the delivery thereafter is to be conducted as in any other labor.

The statistics show that under this treatment three-quarters of the cases were delivered within the first half-hour; the remaining quarter, or one in four cases, would require some assistance. In thirteen per cent. of the cases the interval exceeded an hour.

At first sight these results appear fairly satisfactory; but they cannot be taken by themselves; their value is dependent upon the mortality relatively to the interval.

Now, the position of the second child is special; the maternal passages have already been dilated, and consequently its expulsion is comparatively easy. One would, therefore, naturally expect that the delivery would be more favorable to it than to the first-born, but this was not the case; more second than first were still-born. This naturally suggests two points for inquiry,—What is the influence of the length of the interval, and of the presentation, on the fate of the children?

TABLE I.—PRESENTATION, INTERVAL, AND RESULTS.

Combined data of Reports I. and II.¹

Interval.	HEAD.		BREECH.		FOOT.		TRANSVERSE.		Mortality Per Cent.
	Living.	Dead.	Living.	Dead.	Living.	Dead.	Living.	Dead.	
5 minutes	23	1	8	..	6	..	..	..	4.9
10 "	18	1	4	1	4	..	4	..	
15 "	84	8	5	..	10	..	..	..
30 "	46	8	11	1	13	..	5	..	5.0
1 hour	14	3	1	2	4	..	2	..	19.2
2 hours	8	1	2	..	1	..	..	..	28.5
3 "	2	2	..	..	..	..	..	..
4 "	2	1	2	..	1	..	..	..
5 "	2	3	1	..	..	..	..	..
6 "	2	1	..	..	..	..	..	..
7 plus	1	2	1	..	..	..	..	..	..
Not stated	19	4	11	..	8	..	..	..
Totals	171	25	46	4	47	..	11	..	..
Mortality	12.7 per cent. 1 in 8.		8 per cent. 1 in 12.		Nil.		Nil.		

¹ The intervals are not given in Report III.



FIG. 1.—Longitudinal section through the uterus in the third stage of labor in a case of twins.
(Reproduced from Pestalozza's frozen section.)

In two hundred and sixty-two cases the interval is stated. From the examination of these a most important fact is obtained; it is that *the mortality of the second half-hour was, within a fraction, four times greater than that of the first half-hour*, four and nine-tenths per cent. in the first and nineteen and one-fifth per cent. in the second thirty minutes. (Table I.)

Far, then, from supporting the opinion that we may safely wait for half an hour before extending aid, this fact warns us that, in the interest of the child, we should endeavor to secure the delivery of the second within that period.

The next point of inquiry yields other unexpected and important results. It is generally held that when the second child presents by the head, we may wait more patiently for the return of pains and trust the case to the natural powers. What do the statistics tell us?

TABLE II.—COMPARATIVE MORTALITY BETWEEN FIRST- AND SECOND-BORN OF TWINS AND IN RELATION TO THE PRESENTATION.

First-Born.

	COLLINS.			HARDY.			JOHNSTON.			TOTAL.		
	Living.	Dead.	Per Cent.	Living.	Dead.	Per Cent.	Living.	Dead.	Per Cent.	Living.	Dead.	Per Cent.
Head . . .	147	8	5.1	58	5	7.9	159	11	6.4	864	24	6.5
Breech . .	32	1	3.0	18	1	5.2	} 49	4	7.6	126	12	8.7
Feet . . .	20	4	16.6	7	2	22.2				11	1	..
Not stated.	11	1	..	..	..	..	..	..	..	..	..	..
	210	14	6.25	88	8	8.7	208	16	6.7	501	37	6.8

Second-Born.

	COLLINS.			HARDY.			JOHNSTON.			TOTAL.		
	Living.	Dead.	Per Cent.	Living.	Dead.	Per Cent.	Living.	Dead.	Per Cent.	Living.	Dead.	Per Cent.
Head . . .	121	21	14.7	50	4	7.4	181	18	9.0	302	38	11.1
Breech . .	28	3	9.6	18	1	..	} 61	..	..	152	4	2.5
Feet . . .	82	..	..	18	..	..				26	..	..
Transverse.	7	..	..	5	..	..	14	..	..	12	..	..
Not stated.	12	..	..	..	..	..	..	..	..	..	..	..
	200	24	10.7	86	5	5.5	206	18	5.9	492	42	7.8

In three hundred and forty cases the second child presented by the head, of whom thirty-eight were still-born, or eleven and one-tenth per cent. In one hundred and fifty-six the breech presented, with four deaths, or two and one-half per cent. Further, in all the cases where the feet presented, or where the child lay transverse, seventy-one in number, *all were saved*. (Table II.)

This unsuspected result may be stated in another form. Of the children lost, ninety and one-half per cent. presented by the head, nine and one-half per cent. by the breech, whilst among the footling and transverse there was not a child lost that was alive when the treatment began,—a remarkable commentary on the statement that “the increased mortality results,” among other conditions, “from the frequency of malpositions and malpresentations, requiring operative interference.” (Lusk.)

In the face of these facts we can no longer believe that a case can the more safely be trusted to nature because the head presents. Moreover, when we find from these reports that in every case of the second child, where nature demanded the operation of turning, the child being alive at the time of the operation, its life was saved; in the only four cases of head presentation where turning was performed, all four were born alive; and in all cases where the child originally presented by the feet none were lost; whilst, on the other hand, twelve per cent. of the cases presenting by the head were born dead, the inference is clear that *it is advisable, and indeed one's duty, to secure the delivery of all second born of twins by the feet*.

Such being the case, the next point is simple: there should be *no delay in securing full command of the delivery*, by performing the operation of turning if the head presents, or by bringing down a leg in a breech presentation. As you know, this is easier and safer when done with a lax uterus. There is, besides, if you wait, the risk of the head being driven well into the pelvis. In such a case, turning should not be attempted. I do not wait even to separate the first child; that I leave to the nurse or till I have secured the foot of the second child in the vagina.

A vaginal examination is necessary to confirm the diagnosis of twins, and to ascertain the presentation. With very little further introduction of the hand the membranes can be ruptured, the waters kept back, and a foot secured. Performed thus early, and with due

precautions, the operation is perfectly safe to the mother, and secures the safety of the child.

With the child's foot in the vagina, you have full command of the delivery,—a matter of some importance considering the liability to arrest or insufficiency of the pains. If deemed advisable, time may now be allowed for the process of *retraction* of the uterus, but it is not necessary to wait for *contractions*.

Here, also, my views differ from the traditionary precepts inculcated by many. I do not share in the fear of encouraging hemorrhage by artificially emptying the uterus in the absence of pains. By the property of retraction the uterine walls shrink, or follow down upon the lessening bulk of the contents when artificially extracted, as well as when expelled by a contraction. With the controlling hand on the fundus, and gradual, deliberate, but not precipitate traction, there need be no fear of evil consequences from "an empty and uncontracted uterus."

The management I here recommend to you, and which I have taught and practised for more than twenty years, differs from that of the writers of to-day, but it is not new. It was the practice of the best authorities of the last century. I give you but one quotation. Sir Fielding Ould, in 1742, wrote, "Being convinced that there is a second child, the membranes must be immediately broken without waiting for pains, there being sufficient dilatation already, and introducing the hand into the womb to find the feet, the child must be brought forth by them."

By securing the command of the delivery on the birth of the first child we insure against delay, and, according to the view I have suggested, can deal with the case as we would an *incomplete* delivery under any other circumstances.

The immediate risk in all such cases, as you well know, is hemorrhage, and this is well illustrated in twin cases. That you may fully comprehend the degree of the danger, and the causes, let me place before you the result of the analysis of thirty-five thousand nine hundred and fifty-eight single (excluding abortions) and five hundred and sixty-eight twin deliveries contained in the three Dublin reports.

1. Hemorrhage was five times more frequent in twin than in single births.

2. With twins hemorrhage in the third stage was twice as frequent as post-partum, whereas in single births the numbers in the two groups were nearly equal.

3. In hemorrhage cases the placenta was adherent twice as frequently in twins as in single births.

4. Retention of the placenta from all causes, necessitating manual interference, occurred six times more frequently in twin than in single births.

5. In twin cases where the placenta was retained, adhesion was present in rather more than half the cases, whilst in single births it was present in only about one-third.

These facts have an important bearing on the subject under discussion. It is evident that the difficulty lies in the separation and expulsion of the placenta, and that the difficulty is sufficiently accounted for by the greater bulk of the organ and larger area of attachment, with the apparently greater tendency to morbid adhesion, without assuming, as writers have done, what has not been proved, that there is a greater liability to weak uterine contraction.

Contractions are necessary to expel the placenta, but they are too transient to be depended upon as against bleeding. It is on retraction and retraction alone that we can rely to prevent hemorrhage. Here let me give you, in conclusion, some new material on which to exercise your thoughts.

Because we find that during a pain the whole body of the uterus is simultaneously and uniformly thrown into action, we are liable to assume that retraction also acts equally and regularly throughout. Now, the frozen sections that have been published of the uterus in the third stage of labor show that the process of retraction, as indicated by the thickening of the walls, goes on very unequally at different parts, so long as the uterus is partially emptied. At the placental site, before separation has occurred, thickening is at a minimum, and contrasts strikingly with the rest of the walls. When the placenta is detached, but not expelled, the wall on that side begins to thicken, but owing to the bulk of the placenta it continues thinner than the opposite wall. The latter again may show a varying degree of thickness, being moulded to the inequalities of the surface of the placenta or blood-clot with which it is in contact. Speaking generally, we may say, where resistance or pressure is least,

there the walls tend to become thickest. It is only when the uterus is empty that retraction is uniform and complete.

The marked thickening that may arise at a portion of the wall where the pressure of the contents is slight, and the difficulty that may arise from the increased bulk of the double placenta, are well illustrated in the reproduction I now show you of Pestalozza's frozen section of the uterus (Fig. 1) in the third stage of labor in a case of twins.

This unequal retraction must have an important bearing on the occurrence of hemorrhage. It has its origin in the partial expulsion of the contents; it is very likely to increase in proportion to the time that delivery is incomplete, and it is very probable that the equality of thickness that is attained after the uterus is empty is delayed in proportion to the time the inequality has existed.

The conditions which tend to produce unequal retraction occur specially in twin labors; and the only means of averting this state is to be sure that, after part of the contents have been expelled, the complete emptying of the uterus proceeds regularly and without undue delay.

You cannot, however, treat the placenta as you did the child, that is, by the introduction of the hand and manual traction. Such a course would be meddlesome interference, not help, for the process of separation of the placenta and the membranes would be deranged, and the danger of tearing the tissues and leaving portions behind would be great. But if hemorrhage threatens, or undue delay occurs, artificial aid may earlier and more urgently be required than in single pregnancies.¹

¹ For the management of the third stage of labor, see *INTERNATIONAL CLINICS*, Vol. II., Third Series, 1898.

THE ETIOLOGY AND SYMPTOMATOLOGY OF URETHRO-VAGINAL AND VESICO-VAGINAL FISTULÆ.

CLINICAL LECTURE DELIVERED AT THE PARIS MEDICAL SCHOOL.

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GENTLEMEN,—All genito-urinary fistulæ in women may be classified under two main divisions for purposes of study,—that is, into anterior and posterior fistulæ. This division becomes very simple when we bear in mind the intimate relation of the genital organs with the bladder and urethra on the one hand, and the rectum on the other. Therefore, when there is a communication between the genital organs, or more particularly the vagina with the organs situated in front of it, you have an anterior fistula; if, on the contrary, this communication exists between the vagina and the organs back of it, there is a posterior fistula. The vagina is first in contact with the urethra, then with the posterior wall of the bladder, and finally, higher up, with the ureter. Thus we have three principal varieties of anterior fistulæ: (*a*) urethro-vaginal, where there is a communication between the vagina and the urethra; (*b*) vesico-vaginal, where there is a communication between the vagina and the posterior wall of the bladder; and (*c*) uretero-vaginal, with communication between the vagina and the ureter.

The subject of genito-urinary fistulæ is a very extensive one, and forms one of the most interesting and important subjects of surgical pathology. I shall confine myself to-day to some remarks on the etiology and symptomatology of the first two varieties of anterior fistulæ, namely, the urethro-vaginal and the vesico-vaginal, of which the former is much the more rare. Its etiology is not very complicated. In the great majority of cases such fistulæ are due to a difficult labor, whether terminating spontaneously or where it has been necessary to apply the forceps or some other obstetrical instru-

ment which has been roughly or unskilfully used. Traumatism may be another though much more rare cause than that just named, and abscesses of the urethra opening into the vagina form a third factor. I may here state that urinary abscesses, which occur very frequently in men, are seldom met with in women. Finally, the fourth accidental cause may be the introduction and retention in the urethra of an inflexible sound, with tamponing of the vagina. The mechanism of such a fistula is very easy of comprehension. You are familiar with Sims's catheter, the curve of which is exactly that of the urethra, so that it remains of itself in position. This catheter is inflexible. Now, if you tampon the vagina, Sims's catheter being in the urethra, and the tamponing be made very compact, it is evident that the wall separating the urethra from the vagina, being compressed by the sound on the one side and the tamponing on the other, may—particularly if the compression lasts some time—become necrosed and a urethro-vaginal fistula result.

You have here the four etiological factors of this variety of anterior fistula. I have named them all for the sake of completeness, but must also remind you that, of them all, the first or that variety following confinement is by far the most frequent. You may possibly meet with the others during your practice, but even a single case is excessively rare.

We now come to the symptomatology of these fistulæ, which consists almost entirely of difficulty in micturition.

The leakage of urine into the vagina in cases of urethro-vaginal fistula in women only occurs during urination. The very serious and painful symptoms of incontinence which predominate in vesico-vaginal fistulæ, whether large or small, do not exist in the urethro-vaginal variety. Why is incontinence not present in such a case? Simply because the fistula is located in the urethra below the vesicle sphincter; it is therefore only during micturition, when the sphincter is relaxed, that the urine penetrates into the vagina. The patient spreads the urine and wets herself, but, all in all, the infirmity is not very great, and when certain precautions are taken this symptom will not cause any very serious inconvenience.

I have said that incontinence of urine is not present in urethro-vaginal fistulæ, but must add that while this forms the rule, there is one exception, which, however, seldom occurs. Certain cases are met with where the fistula, although situated in the urethra, may be

very close to the neck of the bladder. Here there is incontinence, for the following reason: When the woman has not urinated for some time the bladder becomes filled and more and more dilated, and finally causes the vesical sphincter to relax, when the urine penetrates into the urethra and from the latter into the vagina. Thus there may be incontinence, but only when the patient has not been able to relieve herself. It is therefore only necessary to empty the bladder oftener, or at least whenever the desire is felt, in order to prevent this symptom.

I now proceed to the second variety of anterior fistulæ, the vesico-vaginal. This form is the most frequent, and is the one which you will mainly encounter in your practice. The etiological factors are of three kinds,—(a) surgical, (b) pathological, and (c) obstetrical.

Surgical Factors.—These may be either voluntary or involuntary. Thus, when the surgeon deliberately makes a vesico-vaginal fistula, either to extract a vesical calculus, or to relieve the pain caused by cystitis, we have a fistula surgically and voluntarily established. When, on the other hand, the surgeon produces a fistula while performing vaginal hysterectomy, either by an accidental stroke of the bistoury against the vesical wall or by compressing the latter with a hæmostatic forceps, we have a surgical vesico-vaginal fistula involuntarily produced.

Pathological Factors.—Among these factors the most important is cancer. I might here add that in cases of the latter disease the fistula is a matter of minor importance when we consider the gravity of the affection itself. Streptococci vaginitis, which very frequently ends in gangrene of the vaginal wall, forms another pathological factor. The three remaining ones are represented by foreign bodies in the bladder and vagina, and by ulcerations of the vagina, most frequently tuberculous.

Obstetrical Factors.—Vesico-vaginal fistulæ of obstetrical origin are very frequently due to a more or less rough or unskilful application of obstetrical instruments, but this is not the only cause. When the head is embedded in the pelvis and remains a long time upon the perineal floor, gangrene may be the result, which, owing to the frequency of vaginal infection, may finally cause a fistula establishing a communication between the vagina and the bladder. As the compression exerted by the head usually occurs at the moment when the latter has passed the lower segment of the uterus, and is in the

vagina, it is almost invariably a vesico-vaginal fistula which is produced. There are, however, cases in which compression by the head takes place while the latter is still in the uterus, and here it is the neck of the womb which is compressed, and a utero-vesical fistula is the result. Such cases are very rare, and consequently you are not very likely to meet with them during your practice. The seat of vesico-vaginal fistulæ varies but slightly; usually they are found below the vesical trigone or at the level of the anterior cul-de-sac. They are generally oval in form, and the long diameter of the ovoid may be either vertically or transversely placed. The latter direction is most likely to be observed when, in surgical cases, an accidental transverse cut of the bistoury has severed the posterior wall of the bladder. The edges of the fistula are thin, but resisting, even sharp; they are encircled by a pearly white edge which contrasts with the mucous membrane of the vagina, which is generally inflamed. The description I have just given with regard to the edge of the fistula applies to the great majority of cases, but not invariably so. In some cases the edges, instead of being of a fibrous consistency, are infiltrated, and they are not pearly white in appearance, but red and blend with the rest of the mucous membrane. This variety is not very frequently met with. It is impossible for me to describe to you all the variations you may meet with. A vesico-vaginal fistula may be exceedingly small, so small, indeed, that it will require a protracted and careful search, which may even then fail to disclose it. It is barely possible in these cases to introduce a probe into the bladder; very frequently the fistula is hidden in a fold of the mucous membrane, and it is a difficult matter to find it. In other instances, on the contrary, you may find a fistula so large that it cannot be overlooked. Upon a digital examination of the woman the finger will pass directly into the bladder, and when a speculum is used you see only the inflamed and swollen mucous membrane of the bladder forming a hernia in the vagina.

The symptomatology of vesico-vaginal fistulæ is very simple. Before passing on to it, I wish, however, to say a few words in reference to the manner in which they are usually diagnosed in the majority of cases. Sometimes they appear immediately after a hysterectomy or the like, the surgeon making a faulty incision with the bistoury, dividing the vesical wall, and the urine at once flows out. Sometimes, on the other hand, they are much more slowly produced

as the result of concealed hemorrhage, which may compress a portion of the vesical mucous membrane to such an extent as to produce necrosis followed by its separation from the healthy tissue, and finally a fistula. This process usually takes place in several days, but the time varies; the urine sometimes leaks out in three days, and in other cases not before the tenth day. Instances have even been reported in which the fistula only manifested itself on the thirtieth day, but these are very exceptional cases. Generally speaking, if twelve days after the performance of vaginal hysterectomy there is no indication of the existence of a fistula, you may be pretty certain that this unfortunate operative complication has been avoided. The symptoms of vesico-vaginal fistula may be summed up as follows. The patient is no longer able to urinate voluntarily, inasmuch as all necessity for the act has been removed. Since all the urine flows directly from the bladder into the vagina, you can readily see that the desire to urinate—which is a phenomenon of a reflex nature, caused by the presence of urine in the bladder—does not manifest itself. The patient is constantly voiding urine, and there is unmistakable incontinence. Curiously enough, there are certain cases in which the patient does not lose control of the urine. This may be the case when the woman assumes certain positions in which she contracts the muscles of the pelvis. One patient may lose her urine while in an upright position and retain it while lying down, and another may retain it when standing up and lose it upon assuming a recumbent position. I operated upon a case of the latter kind in a Sister of Charity. The conditions of which I have just spoken are referable to the seat of the fistula and to the existence of the adhesions which offer a varying amount of resistance to the flow of the urine. The urine voided through a fistula is always infected; it contains a large quantity of mucus, which causes agglutination of the walls of the vagina and of the labia; it also contains a considerable quantity of calcareous salts, which cause considerable annoyance by being deposited upon the hair surrounding the external genitals.

I have still a few remarks to make concerning the lesions of the neighboring organs. These lesions are of great importance, and some of them are very dangerous where a vesico-vaginal fistula is concerned. The first to be considered are the lesions of the neck of the womb. It is most natural that the constant presence of infected urine in the vagina should produce an inflammation of the

latter, and this inflammation may by its extension cause metritis of the neck of the womb. But this is not all; in certain cases the inflammation extends to the uterus and finally to the Fallopian tubes and ovaries, and ends by producing salpingitis or salpingo-ovaritis. The vagina may also be affected. I have already told you that in the majority of cases vesico-vaginal fistulæ are due to protracted compression exerted by the head upon the vaginal wall. Consequently the vagina has not only suffered in the region where the fistula is produced, but throughout its entire length. It has been so distended and compressed that when the reparative processes begin cicatrices and bands are formed, which explains the fact that the vagina is very frequently deformed, retracted, or obstructed by bands. But this is not always the case. When the fistula is the result of a clear cut of the bistoury, the vagina presents fewer pathological changes. It is always inflamed in such cases and there is always a vaginitis present which may be of an ulcerative nature. The inflammation extends to the vulva, and even to the upper portion of the thighs. On the other hand, it may also extend to the anus and the rectum, and, strange to say, the patients then suffer more from the irritation around the anus than from the vagina.

Having cited the lesions of the vagina, the uterus, the annexes, the vulva, and the anus, it only remains for me to refer to those of the bladder and kidneys. The bladder, being no longer protected against micro-organisms, nearly always becomes infected, and there is a more or less pronounced cystitis. What is called ascending infection may also result therefrom; the inflammation extends upward to the ureter and the kidneys, thus causing a whole series of very serious renal lesions. This is in reality the greatest danger in vesico-vaginal fistulæ. You will thus readily see that these fistulæ do not merely constitute an infirmity, but rather a serious malady, which may be complicated by certain lesions sufficiently grave to endanger the life of the patient.

THE PATHOLOGY, DIAGNOSIS, AND PROGNOSIS OF PUERPERAL SEPSIS.

CLINICAL LECTURE DELIVERED AT THE KENTUCKY SCHOOL OF MEDICINE.

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LECTURE II.

GENTLEMEN,—Having included in the last lecture about all that is necessary of the bacteriology of puerperal infection, we will this evening make only a few remarks upon both the bacteria of putrefaction and the bacteria of suppuration, the bacteria that produce sapræmia and the bacteria that produce septicæmia; and then briefly consider the pathology, diagnosis, and prognosis. These infections may be local or general, putrid or septic, confined to the uterus, or carried through the veins and lymphatics into the structures around the uterus, into the peritoneal cavity, the pleural cavity, the pericardium, or into all the tissues of the body, causing inflammation and abscesses in the lung, the liver, the spleen, the kidney, or abscesses in various muscular or connective-tissue structures, or inflammation of the veins and of the cellular tissue, such as we have in phlegmasia alba dolens. These saprophytic micro-organisms are closely allied to the algæ found in streams, plants, animals, etc., and by their growth and putrefaction in dead animal tissue cause ptomaines or toxins, which act as a poison upon the endometrium, or may be absorbed into the system and cause sapræmia. We have also a similar alkaline substance known as leucomaines, which results from putrefaction in animal tissues, but which is harmless unless its elimination is interfered with; but we may have a secondary inflammation of the uterus resulting from ptomaines or leuco-

maines alone, or from the ptomaines and leucomaines in conjunction with the streptococcus or other forms of pus-producing microbes.

When we have an endometritis the result of the germs of putrefaction, as a rule the infection is local, being shut off from further invasion of the tissues of the body by a layer of granulation-tissue with leucocytes under the necrosed superficial layer of the endometrium; but it is possible that we may have, even without mixed infection, the absorption of the products of putrefaction, because of the imperfect protecting layer of granulation-tissue, or because this layer is especially defective at the placental site; but, as a rule, we will find that when there is further involvement of the structures of the body, that it is because there is a mixed infection, and in these cases the protecting granulation-layer is imperfect, so that the poisonous substances, and even the pathogenic microbes, may be carried into the system. Sometimes we find in the mixed infection no protecting underlying layer at all, the adjacent tissues becoming infected at once, and the infection may very soon become general. So that we may have an infection mainly due to the ptomaines or toxins of the germs of putrefaction, a sapræmia; a mixed infection, the septic matter being carried into the blood or into the tissues of the body, acting upon the vital structures, both the products of bacterial growth from the germs of putrefaction and the pus-producing cocci, the general infection being carried into the system by two channels, the veins and the lymphatics; and the ptomaines of putrefaction may be carried into the general system through the lymphatics from the infected tissue about the vulva, because there is a chain of lymphatics that runs upon each side of the vagina connecting with the lymphatic glands above. The lymphatics may also convey septic matter from the lochia or from the neck of the uterus infecting the lymphatic glands higher up. Putrefactive infection may not extend into the system and become sapræmia, because it may not be sufficiently powerful to overcome the resisting power of these lymphatic glands, but where the virulence of the infection is such that these glands cannot prevent further invasion their resistance is destroyed, and very soon we have an extensive putrefactive infection, so-called sapræmia. The numerous lymphatic vessels that surround the uterus may absorb the poison of the saprophytic and of the pathogenic pus-producing germs. They may be absorbed and carried into all parts of the system so early after childbirth that

there has not been time for the formation of a protecting underlying granulation structure aided in its resisting capacity by the leucocytes; so that the system may be overpowered, and vitality, and very soon life itself, destroyed. This general infection may be in one case a sapræmia, in another a septicæmia, and in another a mixed infection, and in either case may be so general and so virulent as to destroy life. The results of the infection may be confined to the endometrium, to the parenchyma of the uterus, to the cellular structure of the broad ligaments, to the peritoneum within the pelvis, or it may extend to the general peritoneum, or to all the structures of the body.

In the thrombo-phlebitic form it is probable that we do not have the action of the ptomaines of putrefaction, but the infection is the result of the germs of suppuration, especially the streptococcus; we may also have the staphylococcus, the gonococcus, or the bacillus coli communis; but in general septic conditions the germ causing the greatest mortality is the streptococcus. In any case where the lymphatic vessels have absorbed and carried through the system the poison and allowed it to enter into the minutest lymphatics, even passing through the lymphatic walls into the adjacent tissues, we find that the veins at the placental site have become collapsed, their inner surfaces united so that there are no channels to convey infection; but when we have infection known as thrombo-phlebitis we have at the placental site the mouths of the vessels filled with coagula, this coagula becoming infected by the germs, which may possibly for a while remain local, but finally the infection gets beyond the block of coagulated blood into the vein by liquefaction around the thrombus, sometimes by a channel through its centre, at other times by liquefaction of the entire clot, so that the germs are gradually or rapidly carried into the veins and into the system, to the heart, from the heart out through the vessels into the lung, the liver, the kidney, the tissue around the kidney, the spleen, and all parts of the body, and we may have infection and suppuration in any of these structures. When this absorption through the veins, in the thrombotic form, has extended into the tissues of the body, causing localized suppuration in the different parts, or in the different organs, sometimes at numerous points upon the surface of the body, we have a condition known as pyæmia, the result of the action of pathogenic micro-organisms, usually the streptococcus.

It is peculiar in how many ways these micro-organisms may act; in one instance they cause a certain effect, in another instance under different conditions they cause a contradictory effect, etc. There is no one of these germs that is more varied in its results than the streptococcus. We find, so far as we can learn from microscopical examination and from culture experiments, that the streptococcus will produce several forms of infection, each resulting in different diseases. In fact, I believe there are distinct diseases where this form of germ is, so far as we know from all methods of testing, of a similar character. Time may develop some means by which the physician will be enabled to discover why it is that this germ is so virulent in its pathological action in one case and so mild in another. At present we are unable to say anything further than to record the varied conditions as they are observed.

We have now briefly considered what is known of the invasion, local and general, of micro-organisms, producing puerperal or child-bed fever, and we see that it is simply a wound infection with some peculiar manifestations due to the structures involved and the existing conditions of the system. We find in these cases, just as in wound infection, that in one instance infection may follow within a few hours after the delivery, and in another it may not develop for a number of days. And again we find, as in wound infection, that where the infection is very soon after delivery there is a greater virulence and greater mortality. We find that in some cases of infection due to the streptococcus there is a condition known as acute sepsis, where the infection begins within a few hours after delivery, and may destroy life within twenty-four hours. A few years ago one of our most beautiful and aristocratic society ladies was delivered, and within twenty-four hours she was dead, from what was diagnosticated by the attending physician obstruction of the bowels. In this case the infection was almost immediate, of the most virulent form, that paralyzed the vital energies of the body, and especially the peristalsis of the bowels, so that by no means—enemata, laxatives, or purgatives—could the action of the bowels be re-established, or any gas or fecal matter be brought away.

We will not consume time upon the diagnosis of puerperal fever, because we know from my lecture on the etiology, and from our knowledge of the action of septic matter upon the system, local or general, and by what has been taught by our lecturer on surgery,

the value of each symptom observed; so that it is only necessary to call attention to a few differential points that may not exist in the general surgical infection.

The symptoms may be mild or they may be severe in proportion to the virulence of the infection and the extent of the involvement. Sometimes infection may result from a putrid condition of the endometrium because of the retention of a little of the decidual membranes, a foul odor coming away with but little elevation of temperature, and but little acceleration of pulse; and in these cases we do not have the severe symptoms that are characteristic of general lymphatic or thrombotic infection. Where the vital functions of the system are overcome, with intestinal paralysis, etc., as soon as we look into the face of the woman we can see in the worst forms a picture of impending death; we see an abdomen often enormously distended; pulse so rapid that we can hardly count it; a temperature of 100° to 105° F., or in some cases before death subnormal. A great variety of symptoms intervene between these two extremes, the disease in one instance beginning within a few hours after labor, in another within twenty-four hours, another within two or three days, and in the mildest form probably within six or seven days.

In the most malignant forms of infection the prognosis, as a rule, is fatal, or is extremely bad, but the severity of the disease is usually in proportion to the time of the involvement. If septic infection begins soon after labor has been completed, we may expect to have a much more dangerous and more frequently and more rapidly fatal form than if the involvement begins later. The rule is that the longer after labor the involvement begins the more favorable the prognosis, because if the infection begins soon after labor it is of a more virulent form, hence it immediately overcomes every possibility of resistance of the system; it becomes a general infection, finally overcoming resistance of the tissues in the entire body, the system surrendering to its ravages, and death soon follows; whereas if infection begins later, there are thrown out within the uterus a more perfect protecting layer of granulation-tissue, or a greater resistance from leucocytes; and the invasion of septic or putrid infection is less marked and the tissues of the body beyond this protecting layer are not so soon overpowered, and in many instances, however, though the disease becomes pretty general, our patient will recover.

Now, gentlemen, with these remarks we will infer that many cases are necessarily fatal. That most cases which begin soon after labor will be fatal, and particularly so where the infection becomes general, as it frequently does where infection begins early. Again, we would naturally infer that where we can confine the septic infection to the uterus that the prognosis would be good, and where the septic infection goes beyond the uterus into the cellular structures between the layers of the broad ligaments, or to the peritoneum of the pelvis, the prognosis would not be quite so good, but favorable if treated correctly; where the infection extends into the peritoneal cavity and causes a general suppurative septic infection, that the mortality would be very great; in fact, practically one hundred per cent.; that where the entire system becomes involved by invasion through the lymphatics or the veins, unless very mild, we would expect a very large mortality; that nearly all of these cases will die, as they are beyond all power of treatment, for no successful result has followed a laparotomy for diffuse general suppurative peritonitis. There have been cases reported where it is claimed that these patients have been successfully operated upon, but I do not believe that the infection was general.

With what we have said upon the bacteriology of childbed fever, upon the action of micro-organisms upon the system locally or in a general way, we are now prepared to anticipate what would be the treatment in these cases; and we are prepared to understand that the treatment must be different in different cases; that in one instance we will apply one means or remedy, in another we may apply an entirely different means or a different remedy. So, then, the treatment of puerperal fever is in its modern sense one of the most important subjects in the domain of gynecological and obstetrical practice, and we will defer further remarks upon it until the next lecture.

Ophthalmology.

QUESTIONS FOR CONSIDERATION PRELIMINARY TO OPERATIONS FOR CATARACT.

CLINICAL LECTURE DELIVERED AT THE ROYAL LONDON OPHTHALMIC HOSPITAL.

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GENTLEMEN,—There are several questions, of the greatest practical importance, which have to be considered before undertaking an operation for cataract, and which, in the majority of text-books on diseases of the eye, are only briefly, if at all, referred to. These I propose to discuss to-day.

First let me point out that it may be taken as a rule that, when the crystalline lens has once become opaque, the only way in which sight can be restored is by removal of the lens. It is only in a few very exceptional cases, where cataract has occurred in connection with diabetes and where the general condition of the patient has markedly improved, that the opacity has been known to disappear, the lens regaining its normal transparency. The old method of displacing the opaque lens from the axis of vision has been completely abandoned as uncertain and unsafe.

When is a senile cataract ripe for operation?

This is a question the answer to which has of late years become much modified. Formerly a senile cataract was not considered "ripe" until the lens was completely opaque,—i.e., until no shadow was seen cast at the pupillary margin of the iris on the surface of the opacity. The reason for thinking it necessary that the whole lens should be opaque before attempting its removal was that the operator might be insured against the risk of leaving portions of the cortex behind. If the cortical matter be transparent, it is not seen; consequently some of it may be easily left, though the pupil appears quite black and clear.

It was observed that when cortical lens matter was left, inflammatory troubles frequently ensued; hence the anxious desire for its complete removal. If we consider why it was that when cortical lens matter was left there should have been this tendency to inflammatory mischief, we may be sure that it was not, as was frequently stated, the mere contact of the lens matter with the iris which started the iritis. We frequently see, after operations for dissection of the lens, the anterior chamber nearly filled with lens matter without any iritis being set up. The probable explanation is that lens matter, being a tissue of low vitality, forms an excellent pabulum for inflammatory exciting micro-organisms to flourish in, should they, during the operative procedures, be introduced into the globe. In former times, when less care was taken in the sterilization of the instruments employed, this was probably not unfrequently the case; hence the greater risk run when cortical lens matter was left. Nowadays, when elaborate precautions are always taken to render all instruments used aseptic, it is found practically that the risk of operating on incomplete cataracts is considerably decreased.

When, then, is the proper time to remove a senile cataract? Some senile cataracts are exceedingly rapid in becoming opaque; others remain, involving only a portion or portions of the lens for several years. In the ones that rapidly mature it is well to abide by the old rule, and wait until no shadow is cast at the pupillary margin of the iris. By so doing the cataract may be entirely removed, and the necessity of a secondary needle operation being required rendered less probable.

In the slower ripening forms of cataract, where the opacity is so located as to incapacitate the patient from reading and writing, or from following his occupation, I now no longer condemn my patients to years of uselessness, but proceed to extract the lens in the usual way. If afterwards I find that cortical matter has been left which I did not see at the time of the extraction, but which has since become opaque, I proceed to tear freely across the capsule with a needle, and expose the remaining lens substance to the aqueous humor, so that it may become dissolved.

To put it briefly, then, a senile cataract is ripe for operation when the opacity is of such density, or so situated, as to prevent the patient from following his occupation, or from reading and writing.

If a patient has a cataract in only one eye, under what circumstances ought it to be removed?

Before answering this question, it is necessary to consider what a patient will gain by removal of the cataract. He will not regain binocular vision, for he will not have the power of accommodation; and to see distinctly with the eye operated on, he will, for different distances, require different degrees of high plus glasses. The two eyes, one with a high plus glass and one without, will not work together. The patient, with good acuity of vision and the power of accommodation in one eye, will not wear a high plus glass for the other. Without a plus glass in front of the other his field of vision for large objects only will be enlarged.

The question then narrows itself into whether it is worth a patient's while to run the risks of a cataract operation in order that the field of vision for large objects on one side may be enlarged? In certain occupations, as, for instance, in those who drive vehicles, the loss of power to see large objects on one side is a serious hinderance, and in such the cataract should certainly be removed. Cataracts vary considerably in color: they may be so inconspicuous as only to be recognized by a skilled observer; or they may be densely white, form a distinct disfigurement, and be obvious to every one. A one-eyed cataract may sometimes be justly removed for cosmetic reasons rather than the restoration of vision.

If a patient has a complete cataract in one eye and only *striae*, which do not interfere with vision in the other, it is advisable, provided the patient's expectation of life is good, to extract the ripe cataract rather than wait until failure of vision occurs in the second eye. If a cataract is allowed to become hypermature, thickenings and calcareous deposits frequently form on the inner surface of the capsule, which sometimes render it exceedingly difficult to deal with. The suspensory ligament also, when a cataract is overripe, tends to become weak, and the chance of its giving way and the vitreous humor escaping, in the process of extraction, consequently increased.

It being determined that the condition of the cataract itself is such as to justify operation, it is next necessary to decide, so far as possible, the condition of the other parts of the eye. Cataract is not uncommonly formed secondary to disease of the deeper parts of the eye, of the retina, and of the choroid. Whether or not the deeper parts are healthy can best be estimated by the activity of the pupil and the patient's power of perception of light.

A cataract may sometimes be so dense that a patient is only just

able to distinguish light from dark. If, however, perception of light is totally abolished, it may confidently be assumed that the opacity of the lens is not the only lesion, but that one of the deeper structures is also affected. If a patient can tell light from dark, but is unable to indicate correctly the direction from which light proceeds, there is sure to be disease of one of the inner tunics of the globe, and the removal of the cataract will not restore the patient's sight.

The condition of the conjunctiva and the lachrymal apparatus must be carefully investigated preliminary to any operative procedure; any purulent discharge from either of these structures would be almost sure to infect the wound. If there is any doubt as to the presence of a conjunctival discharge, a good plan is to tie the eye up for a night with a compress, and to note on its removal if the lashes or margins of the lids have become at all gummed together.

If the patient has any regurgitation on pressure from the lachrymal sac, indicating obstruction in the lachrymal duct, this must be cured before the removal of the cataract is undertaken. So great is the risk of infection from the retained lachrymal secretion that at one time, in cases of lachrymal obstruction, with cataract, total destruction of the lachrymal sac was advocated as a preliminary procedure. Such an extreme measure is not, however, necessary. I have collected nine consecutive cases from the Moorfields Hospital registers in which the lachrymal obstruction was treated by probing and syringing with antiseptic solutions some weeks previous to the extraction operation, and in none of these did infection of the wound occur.

As an additional precaution to the probing and syringing, I introduce, just previous to the operation, an iodoform style into the lachrymal sac and duct.

Extraction of cataract is not an operation of urgency; the time at which it is to be performed can be selected with deliberation. A delay of a few months makes practically no difference to the chance of success. We naturally ask, then,—

Is there any season of the year better suited for operating than another?

If the operation is performed in the late spring, it insures the patient having warm weather before him, and so renders him less liable to exposure to chills in the first months following the operation. I attach, however, very little importance to the season of the

year, and never hesitate to operate in any month when other circumstances are favorable. It is best to avoid operating in extremely hot or cold weather, as it may tend to make the patient restless and sleepless during the necessary confinement in bed for the first two or three days after the operation.

Are there any circumstances connected with the general health of the patient which should lead to postponement of the operation?

Not uncommonly patients are admitted to the hospital much debilitated from want of sufficient wholesome diet and improper hygienic surroundings. These require to be kept in the hospital and fed up before the cataract is removed. If a patient has a cough the operation should be postponed until it is cured. Intemperate patients had best be kept in a home or hospital, where their allowance of stimulants can be regulated, for a short while, as a preliminary procedure, so that the possibility of the occurrences of an attack of delirium tremens shortly after the operation may be avoided. Patients subject to constipation should have their bowels brought into regular working order with saline purgatives, to avoid any subsequent straining when at stool.

If a patient has ripe cataracts in both eyes, should both be operated on at the same time?

Formerly this was not unfrequently done. Before the introduction of cocaine the performance of the two operations at the same time had the advantage of necessitating only the single administration of a general anæsthetic. Frequently, from the way an eye progresses after operation, or the way the patient behaves, valuable suggestions are afforded which are of assistance in the treatment of the second eye, so that now the two eyes are never operated on at the same sitting.

If a patient has had a cataract extracted from one eye but requires a needle operation, and has a cataract ripe for operation in the other eye, which operation should be performed first?

I generally advise that the eye which has the least to lose—i.e., has the worst sight—should be chosen for operation. It means usually that the second extraction should be performed before the needling. Many patients, however, prefer, as they say, to have one eye finished before the second is touched.

When, after cataract extraction, should a needle operation be performed?

It is important to have some general rule as a guide on this point. A needle operation, though in itself a very simple procedure, is by no means free from risks. What defect of vision is it that renders it worth a patient's while to run these risks? If a patient with distance glasses can see 6/18, they can with their near glasses see to write and read newspaper type. I never perform a needling, therefore, unless the vision is less than 6/18.

How great a defect of sight caused by zonular cataract justifies operation?

After the removal of a zonular cataract the power of accommodation is destroyed, and the patient has to wear high plus glasses. We have then to consider what defect of vision caused by zonular cataract renders it advisable to sacrifice the power of accommodation? Unless a patient's vision is less than 6/18 I do not generally advise removal of the cataract. Vision = 6/18 is, as I have already indicated, sufficient to enable an individual to follow all the ordinary occupations of life. In these cases it is well to complete the removal of the cataract in one eye first, and then, if the patient is old enough, he is able to appreciate the increase in the acuity of vision he has acquired, and the disadvantages incident on the loss of power of accommodation, such as the necessity of wearing two pairs of glasses. He is then able to choose for himself whether or not he considers it advantageous to have his second eye operated on.

At what age should a case of congenital cataract be operated on?

This is a matter worthy of careful consideration. During the first few months of life the anterior chamber is exceedingly shallow, and in cases of congenital cataract the pupil often does not react well to a mydriatic. The operation of discission is not, therefore, very easy to perform, and, there being only a small amount of aqueous humor, the lens substance does not readily become dissolved. On the other hand, if the operation is long delayed, valuable time is lost in the education of the visual centres, nystagmus is developed, and the lens capsule becomes thickened and calcareous. In an infant the after-treatment, such as the applications of drops, etc., is more easily applied than in a child two or three years old.

I generally in these cases advise the operation to be done when the child is a year old. It has the disadvantage of coinciding with the commencement of dentition, but is the age which seems least open to the above-mentioned objections.

**CYST OF THE ORBIT, WITH REMARKS ON TUMORS
OF THE ORBIT IN GENERAL; SYPHILITIC IRI-
TIS; THE PREVENTION AND CORRECTION OF
MYOPIA; THE TREATMENT OF SYMPATHETIC
OPHTHALMIA.**

CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC.

BY THOMAS R. POOLEY, M.D.,

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New Amsterdam Eye and Ear Hospital.

GENTLEMEN,—This patient gives an indefinite history of having had a sensation of pain in the eye, "as if something were in it," and then after a few months he noticed a swelling in the inner and upper angle. The vision at that time was unimpaired. He came to me eight days ago, and the symptoms which he then presented were very much the same as you see to-day, although an operation has been performed on his eye. There was swelling in the upper and inner angle of the eye; there was slight drooping of the lid; in this situation, ptosis, or inability to raise the inner two-thirds of the lid. There was no pain, and the movements of the eye were unimpaired. The sight was good, and there was no double vision. Palpation over the upper lid at the inner angle showed a boggy swelling, which seemed by pressure to be under the lid, and gave the sensation of deep-seated fluctuation. Exploring the orbit carefully, I could readily discern its margin, and by palpation as deeply as possible, when the patient was under ether, I failed to detect anything like an exostosis, nor had I anticipated this, as there was no disturbance of the movement of the eye. Thorough eversion of the lid, the patient looking downward and the lid being pulled upward, so as to bring into view the reflexion fold, at once revealed a swelling at the upper and inner angle of the conjunctival cul-de-sac, which showed itself by prominence of this part of the conjunctiva. I

made a diagnosis of conjunctival or orbital cyst, possibly a vascular tumor; the latter I hardly thought probable on account of the lack of vascularity in the swollen part of the lid. I have often seen conjunctival cysts in this region. An operation was attempted for the removal of the growth by attacking the tumor from the inner side where the swelling of the conjunctival sac seemed greatest, and the conjunctiva of the globe seemed to be attached to the conjunctiva of the lid. I dissected the conjunctiva carefully from the anterior part of the tumor with the scissors, and came down upon what appeared to be a cyst wall. I liberated the anterior part of this cyst wall, and found that it passed down deep into the orbit. While continuing the dissection with a view of removing the entire cyst wall and its contents, a quantity of what looked like the contents of an atheromatous cyst made its appearance in the wound. It was a yellowish-white, homogeneous mass, and while in many respects it looked like the contents of such a cyst, it was a little too consistent and hardly as white as the ordinary contents of a sebaceous cyst. I at first thought that I had opened the posterior part of the cyst wall, and that this was the contents of the cyst evacuating itself through the wound, but I was surprised and perplexed at the immense quantity of this material which was evacuated. As long as pressure was made downward and inward, towards the apex of the orbit, this material would be discharged. A sudden fear possessed me that the case might prove to be one of those rare forms of encephalocele. The operation was terminated by closing this conjunctival wound with sutures, and you notice that the wound so far has healed very nicely. The appearance is now very much the same as before the operation. Swelling of the lid, however, is fully as pronounced as before the operation, and added to this are redness and swelling. My belief is that the case will be cured. I think now we must have evacuated nearly all the contents of that cyst, and we have dissected away the whole anterior wall, but have set up sufficient traumatic inflammation in all probability to obliterate this cyst. There have been no unfavorable symptoms, and there has been so little swelling that only cold applications for a few hours have been required.¹

¹ A second operation was afterwards made by making an incision through the eye-lid, evacuating the contents of the cyst, keeping it drained by a drainage-tube, and making daily injections of peroxide of hydrogen, under which treatment a complete cure was effected.

The case is among the rarer forms of orbital diseases. Cysts which occur in the inner angle and present themselves under the integument are common enough, but I refer to cysts which develop in the depth of the orbit. The only remarkable feature of the case is that a tumor of sufficient size to contain so much sebaceous material could develop to such an extent with so little disturbance of the movements of the eyeball, and without pain. The tumor was situated in that part which it would naturally occupy if it had developed from below upward in the direction of the least resistance. We still feel a swelling of the lid, yet there is no growth between the conjunctiva and the integument, and therefore this sensation of fulness and fluctuation must be caused by the tumor filling the upper part of the conjunctival cul-de-sac and finding its largest development in this direction; it naturally pushes the cul-de-sac outward.

In regard to these tumors in the orbit, we have a number of such growths, but this may be considered as one of the rarer forms. A tumor developing in much the same way may be found, which upon operation proves to be sarcoma. Sarcomata develop much as this has done. Sometimes the first intimation of their presence will be some mechanical discomfort in the movements of the eye, and then soon afterwards diplopia will develop, and the patient will seek medical advice.

A man sixty years of age came to consult me four or five years ago. There was evident diplopia, but in searching for its cause I found on examination of the orbit a tumor about in the centre of the orbital floor, and I at once expressed the opinion that it had invaded the orbit secondarily, having originally developed in the maxillary antrum. I advised an operation, and performed it shortly afterwards by making a curvilinear incision along the orbital floor, keeping close to the bone, and exposing the lower part of the orbit. The tumor was yellowish, and was surrounded by eroded edges of bone. I followed it through into the antrum, which it filled, and scooped it out, carrying the dissection even into the nose on the same side. He recovered satisfactorily from this operation, but the tumor returned and invaded the depths of the orbit, and finally became visible in the post-pharynx. The eye was removed, the orbit cleaned out, and a large part of the superior maxilla was removed, and the remarkable thing is that the patient is still alive, although there is a large in-

durated swelling over the upper part of the maxilla. Metastatic tumors developed in different parts of the scalp, and, strange to say, disappeared spontaneously.

Sarcomata may also show at the margin of the orbit. I removed one in the Charity Hospital quite easily. I found it to be an encapsulated sarcoma, apparently developing in the orbital periosteum. We may have vascular growths developing much as the tumor did in our patient here, only the vascular nature is usually much more evident, and deep-seated pressure will usually cause temporary disappearance of the growth from cutting off the circulation. Electrolysis, cautery, and the like are used by some timid surgeons in the treatment of these growths, but I believe in dissecting them out. Of course the operation will be bloody, but by exposing the seat of the tumor and controlling the bleeding you will find that the tumor has developed in the cavernous tissue, which can be dissected out. The method, which I learned from Dr. Knapp, has been to remove all these growths with the knife, and I believe it to be the best mode of treatment. There is one form of vascular growth of the orbit in which even an operation for exploration is inadmissible,—viz., a tumor of the orbit with marked exophthalmos, often with neuro-retinitis, and where there is a pulsation over the exophthalmic eye, or on parts of the skull adjacent to the eye,—the so-called cases of pulsating exophthalmos. In these cases there is an injury to the cavernous sinus. An arterio-venous aneurism is formed, with consequent pulsating exophthalmos. Such cases are to be cured by ligature of the common carotid artery, and beautiful instances of this condition have been described by Jonathan Hutchinson and others in England, by Gruening and Knapp in this country.

There may also be bony growths in the orbit, and they are among the most interesting of all. In the *Medical Record* quite recently I have described a very remarkable case of this kind which I showed here. The growth developed in the upper and inner angle of the eye, pushing it downward and outward, impairing its movements and giving rise to optic neuritis. There was intense swelling and œdema of the lids, and an enormous protrusion of the eyeball, along with grave constitutional symptoms, such as fever, headache, and mild delirium. She was operated upon subsequently, and the growth removed with chisel and gouge. The eye was not sacrificed.

and even the muscles were left intact. Such operations are necessarily grave and the outlook uncertain. One feature in some of these cases is that they generally invade other cavities and often develop in the frontal or ethmoidal sinuses, so that the growth must be removed not only from the orbit but from these cavities as well. All these operations require much patience, surgical tact, and ability, but where the patients' lives are threatened it seems to me to be one's duty to operate. I removed an exostosis from the orbit where the patient had periodical attacks of epilepsy; but I was unable to find any attachments of a tumor in the orbit, as it filled entirely the apex of the orbital cavity, so that it was only by chisels and burrs that the growth was removed. Another branch of the tumor in the frontal sinus I found impossible to remove. The patient recovered nicely, but returned a few weeks later with all the symptoms of pyæmia, and he died of purulent meningitis. The autopsy showed that a part of the growth in the frontal sinus had perforated the orbital roof and projected into the brain, pressing upon the dura and the brain, thus causing the epilepsy. I think if I had followed the growth a little farther I might possibly have saved this patient's life, but I desisted on account of the seeming gravity of the operation. In all these cases you should certainly look for the presence of optic neuritis, and in a large proportion of cases it will be found to be present.

SYPHILITIC IRITIS.

This colored boy, whom I have shown you several times, has some iritis left and considerable lachrymation. There is still freedom from pain, but the patient has suddenly developed an abundant eruption, which appears to be a pustular syphilide. I had hitherto supposed the case to be entirely of traumatic origin, but this explains the persistence of his iritis. The patient now tells us that he had his chancre two months ago. He will be put upon moderately large doses of biniodide of mercury. The papular or pustular syphilide developing as a secondary symptom indicates the worst form of the disease.

THE PREVENTION AND CORRECTION OF MYOPIA.

This boy says he sees better with one eye than with the other, and that his eyes hurt him, particularly in the evening. This latter

symptom is very common in inflammation of the lids. It has been authoritatively stated that when the patient has pain in his eyes on getting up in the morning he has no error of refraction, but this statement is entirely unfounded.

First let us examine this young man's refraction. With both eyes, he can read type No. 70 at twenty feet, hence his vision with both eyes may be recorded as 20/70. With the right eye alone vision is 20/100, and with the left eye 20/70. If at twenty feet the acuteness of vision is impaired, the supposition is that there is myopia or astigmatism, since a myopic or astigmatic person nearly always has diminished acuteness of vision. This patient sees better at a distance with a concave glass, and hence he is myopic. The weakest concave glass with which he sees distinctly in the distance is the measure of his myopia, and it will always be the most pleasant for the patient to wear the weakest glass which gives approximately normal vision.

We now find that with -2 D. the V. = 20/20 in the right and with 1.5 D. $-20/15$ in the left eye. As there is considerable difference in the acuteness of vision of the two eyes, it may be well to make an ophthalmoscopic examination, or an examination with oblique light, to account for this difference. Does this man require glasses? His father and mother have good sight, but his brother wears glasses. The patient goes to school, but careful inquiry shows that the arrangement of desks and the illumination of the school room are not at fault. It is a law which is approximately true that myopia does not increase after adult life, and so we have here to prevent as far as possible the increase of his myopia until he reaches that period. One has but a faint conception of his duty as a physician if he thinks he has done his whole duty to a patient when he gives him a pair of glasses.

The matter of the development of myopia has received much thought and study, and considerable attention has of late years been given to the subject of increase of myopia in students. Professor Herman Cohen, of Breslau, has compiled the refraction of all the school-children in that part of Germany over which he has jurisdiction, and has shown the enormous percentage of the increase of myopia in the school and college children in passing from the primary to the higher grades. We ought, therefore, as advisory counsel to families in regard to their children, to give them a proper

idea of what they should do with their myopic progeny. It is all-important to regulate the conditions under which the children have to study, as to the source of light, the number of hours' work a day, and to select proper glasses. There is undoubtedly a tendency of both acquired and hereditary myopia to increase when the eyes are used. We should first endeavor to prevent myopes from pursuing their studies with the head hanging down, which favors a hyperæmia of the choroid and a tendency to progressive inflammation of the choroid and sclera. The patient should be able to see at a sufficient distance to obviate the necessity of holding the head in such a position, and whether or not we give glasses, the importance of avoiding this habit must be impressed upon the patient. There is not enough myopia in our patient here to necessitate his assuming this position. The best direction for the source of light is from behind, obliquely over the shoulder. If this boy's work at school required him to look across a large room at the black-board, we should be compelled to give him glasses, although for his ordinary work he does not need such help. He states, however, that his work does not require such distant vision. The danger of bringing the work near (as they necessarily must do) is that the associated stress upon the internal recti muscles will be too great, and as a result affect these muscles, and we shall get a condition known as insufficiency of the interni. It is claimed that this straining of these muscles also favors an increase of myopia. To avoid this a concave glass is needed; hence if the myopia be excessive we must give a glass to read with which is weaker than the one used for a distance. In this patient's case we may ignore the necessity for glasses, except for the distance. An examination with an ophthalmoscope in many of these cases will show that there is a sclero-choroiditis posterior. There may be an atrophic crescent in the choroid with the concavity towards the optic disk: the commonest side for it is on the outer side of the disk. If the line of demarcation of this crescent from the healthy choroid is sharp and well defined, the probabilities are that the disease is non-progressive, but if the choroid and retina adjacent to it be hyperæmic, we have to fear that the case is a progressive one, especially if there is thinning of the choroid in the neighborhood of the macula, and if with such signs the patient has subjective signs of irritation of the eye,—pain, flashes of light, photopsia, or the like,—we have then in the patient's interest to put a stop to the

use of the eyes during the time when this myopia is so distinctly aggressive. In these periods of activity or irritation we take the patient from work and, if the case be urgent, keep him in the dark and employ some antiphlogistic treatment. Certainly such treatment prevents an increase of the myopia.

THE TREATMENT OF SYMPATHETIC OPHTHALMIA.

I shall now take up again the subject of sympathetic ophthalmia and shall consider the question of therapeutics. The whole question of treatment of sympathetic ophthalmia resolves itself into the following three propositions: the first, and the all-important one, is the question of enucleation of the injured eye; secondly, the treatment of the sympathetically affected eye, particularly the acute or progressive stage of the disease; and, thirdly, the treatment of the sympathetically affected eye after the disease shall have expended itself, or the treatment of the result of sympathetic ophthalmia.

In considering the question of enucleation, I will state to you what Mauthner calls his creed as to the question of enucleation. It runs about thus: preventive enucleation may be done; in the stage of sympathetic irritation, enucleation must always be done; in a sympathetic serous iritis and irido-cyclitis, enucleation should never be done; in irido-cyclitis, providing the injured eye has been entirely lost, it may be removed, but not during the irritative stage of inflammation or when the inflammation is at its height.

If I were to express my own belief and views, founded on an experience of many years, I think I would endorse this creed of Mauthner, although in doing so I feel I am at variance with some good authorities.

When you have done a preventive enucleation, you are sure that nothing serious will happen. If the patient comes to you with the eye *certainly* lost from injury, and especially if a foreign body be present in the eye, I say enucleate before the stage of panophthalmitis sets in. Mauthner devotes page after page to the discussion of the danger of removing the eye during the stage of panophthalmitis, but this is an outside question, because, if the patient already has panophthalmitis, there is very little danger of sympathetic ophthalmia.

The question is more difficult if the injured eye still possesses considerable vision, and the turning-point in all these cases is the

quality and character of the patient before you. If he be a person who is densely ignorant, and whom no argument will hardly make alive to the situation, and to whom the chances for vision are problematical, take out his eye, if his consent can be obtained; but if the patient be intelligent enough to understand the situation, warn him of the danger of the occurrence of sympathetic ophthalmia, and state to him very plainly the necessity of at once applying for medical advice if any symptoms of irritation develop in the other eye.

If a patient comes to you having lost one eye, and suffering from what is called sympathetic irritation in the other, you should *insist* upon enucleation, and if the patient refuses to have the operation performed, the sooner you part company with him the better. The symptoms of irritation are watering of the other eye and pain, with increased presbyopia; and if these symptoms persist, he is in all human probability on the eve of an outbreak of sympathetic ophthalmia, and although there may be a few exceptions to the rule, we know that if the eye be removed at this time the patient will be safe from further calamity.

Now, shall we enucleate if the patient has serous iritis or iridocyclitis in the fellow-eye? I say no. I might detail the cases reported by Mauthner where the operation has been done *after* there has been a serious iritis in the sympathetically affected eye, which show that enucleation of the injured eye not only does no good, but seems to make the serous inflammation take on a more malignant form. As I look over my own experience now, I think I have observed this hastening of the progress of sympathetic disease. The other great argument is, that if the injured eye is not certainly lost, there is no telling which will be the useful one when the sympathetic disease has stopped. In speaking of the forms of the disease, I have already referred to a case of my own where the sympathetically affected eye was lost and the injured one retained good vision. Others have reported similar cases, but my own is one of the most conspicuous on record. It is very hard, as a consultant, to say that the eye should *not* be removed, as the other practice is the one now in vogue.

Our fourth proposition is, that enucleation may be done in iridocyclitis, provided the inflammation is not too active and if the injured eye be certainly lost, but this statement does not help us much.

Take the creed of Mauthner and you are pretty well provided with the best possible arguments for every case of this kind which comes before you. Other operations which are done upon the injured eye may well be discarded. It has been proposed to do neurectomy of both the optic and ciliary nerves, or only the ciliary nerves, and these operative procedures have actually been practised, but they have now ceased to be.

In speaking of the treatment of the sympathetically affected eye we come upon a most unsatisfactory and unfruitful field. The patient is kept in the dark, atropine is put in the eye, and hot applications used; and, according to the best orthodox opinions, mercury is given internally or by inunction. I have done all of these things, and I have always lost all the eyes, but some people have had a more fortunate experience. It seems, of course, rational, when the salient feature is a tendency to the formation of synechia, to use atropine; but I am decidedly of the opinion that the man who fails to remove the eye in sympathetic irritation simply invites a chapter of calamities as a result of the failure to do his duty.

As for operations upon the sympathetic eye during the stage of inflammation, my personal opinion is that they should not be performed. Mauthner, who has collated most all of our knowledge on this subject, says that if there be increase of tension and consecutive glaucoma as a result of the inflammation, an iridectomy should be performed, but I do not agree with him on this point. If you operate upon an eye during the active stage of sympathetic inflammation, it is my experience that you make matters worse.

Now, if there is an opportunity to make matters better after the disease has expended itself, if you contemplate performing any operation upon the sympathetically affected eye, you must wait until the eye becomes quiet, and then an operation may be performed which may possibly restore some of the vision to this lost eye. As the final feature you will find exclusion of the pupil, atrophy of the iris, and perhaps cataract, and if at last you find a condition such as the one described, where the eye is free from irritation, you may essay to do an iridectomy. I have in mind one of the cases in which I wished to do such an operation, but the appearances were so unfavorable that Dr. Knapp had refused to operate. I took the patient to the Charity Hospital and did the operation there, which resulted

in restoration of thoroughly good sight. I sincerely respect Dr. Knapp's opinion and his much larger experience, and I presume his observations had led him to conclude that but little good came from such operations. In another case, where there was cataract as a result of sympathetic inflammation, I performed iridectomy, and subsequently discissions of the lens, opening the capsule near the margin, with the result of causing the absorption of the cataract and restoration of the sight after four or five operations. Hence, as to this last question, it may be answered both negatively and affirmatively. It must be a very decided "No" when there is any tendency of the inflammatory process to progress, but this having subsided, a comparatively hopeless case may be restored to some degree of useful vision. I think this embraces what is practical, and what is my own settled practice and belief in regard to the therapeutics of this most terrible of all eye-diseases.

Laryngology and Rhinology.

NASAL STENOSIS AND SOME OF ITS EFFECTS.

CLINICAL LECTURE DELIVERED AT THE LOUISVILLE MEDICAL COLLEGE.

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GENTLEMEN,—We have two cases this morning illustrating two different forms of nasal stenosis, or obstruction of the nose. The first case is a very common form of nasal trouble, and one in which the diagnosis is usually easily made,—that is, nasal stenosis as a result of engorgement of the turbinal tissue, or the tissue covering the turbinal bones. The etiology of this trouble is usually frequent relapsing coryza, or common colds. The patient's skin and mucous membranes may be in bad condition, he is exposed to cold weather, winds, etc., and as a result of this exposure we have an acute coryza, an acute nasal catarrh, or an acute rhinitis, going through the regular stages of cold in the head. Each successive cold leaves the mucous membrane a little more relaxed, and renders the patient more susceptible to further attacks of cold. The cause is located in the submucous tissue; the blood-vessels are located, as you will remember, in this tissue; after repeated attacks of coryza, or cold in the head, this tissue and likewise the blood-vessels become relaxed, they do not empty themselves of blood promptly, consequently we have swelling or engorgement of this tissue, which obstructs the passages.

The symptoms of what we call chronic cold in the head, or chronic coryza, are excessive secretion, both posterior and anterior, with inability to breathe through the nose, especially when lying down, the patients becoming mouth-breathers. I have told you of the dangers of mouth-breathing; that the nose is not only intended

for the purpose of smelling, but also for respiration; that in breathing through the nose the air is rendered more moist, and that it is filtered of its impurities to a large extent; the air passing through the nasal passages is heated to almost the body temperature before it reaches the lungs; that unless the atmosphere is rendered moist, filtered, and warmed before it enters the lungs it is not well prepared for pulmonary metabolism or exosmosis, thus oxygenation and aëration are interfered with, which in turn produces a deleterious effect upon the health of the individual.

We must differentiate here as to the cause of nasal stenosis. It may depend upon several causes. A nasal polyp may produce it; it may be the result of an increase in the bone, producing ridges or spurs of the septum; it may be the result of a thickening of the nasal septum; it may be the result of the condition we have in this case, nasal engorgement; it may be the result of cartilaginous growths; it may be the result of hypertrophied tissue.

We will examine the case before you and see if we can demonstrate to your satisfaction the cause upon which this stenosis is dependent. In examining the nose we use a mirror focussing light at about six inches; get a good light from the window at a distance of about fifteen feet. We use a trivalve speculum, throwing the light into the nasal cavity with the mirror. We find that the mucous membrane is smooth, not quite as red as usual in nasal engorgement, and looks as if it might be in the first stage of nasal hypertrophy. Cocaine will assist you in making a diagnosis here, as atropine does in iritis. If the trouble is an engorged condition, not a polypus, not a bony or cartilaginous growth, or a true hypertrophy, you will find that a four-per-cent. solution of cocaine will cause a shrinking of the tissue in a few minutes, which will allow free nasal breathing. We will take a probe and press upon the turbinal tissue, and we find it shrinks under it. On the left side the shrinking is especially marked; there is not so much on the right. Judging from the color of this enlargement, as it is not so red and turgescient as it should be, I believe there is also some hyperplasia. We will now use cocaine, a four-per-cent. solution, which serves a double purpose: first, it shrinks the tissue, thus enabling me to make a much better examination; second, it produces local anæsthesia, and we are thereby able to make applications without producing pain. We take a four- or five-per-cent. solution of the muriate of cocaine and spray a little

into the nose, then give the patient two or three minutes' rest. We spoke of engorgement and of hypertrophied tissue. In an engorged condition of the tissue the mucous membrane is usually very red; in hypertrophy the color is more of a gray or grayish white; again, in hypertrophied tissue the surface is usually rough or furrowed, sometimes corrugated; in engorgement it is generally smooth. In a simple engorged condition spray the nose with cocaine and you will find that it contracts the blood-vessels; the tissue recedes or shrinks; in an hypertrophied condition of the mucous membrane you do not get nearly as much shrinkage. The hypertrophy extends through the entire mucous membrane; it is not like an engorgement of the blood-vessels, and cocaine does not cause shrinkage. Nasal polyp will give about the same line of symptoms as already detailed, excessive secretion, obstructed nose, etc., the only difference being that the symptoms resulting are more constant. In an engorged condition, such as the one before us, the patient occasionally breathes very well, the blood-vessels sometimes empty themselves, and free breathing is permitted. In nasal polyp the nose is chronically obstructed. This is another point to be borne in mind in making your diagnosis. Again, a polyp is entirely different in color, looking almost like a piece of jelly, and will be found hanging in the nasal chamber. It is movable; you cannot empty it as you can the engorged condition, by pressing upon it with a probe. In nasal obstruction the result of bony or cartilaginous growths, you cannot move the obstruction by means of a probe; they are stationary and hard. In cancerous growths we have pain, and are more likely to have bleeding. In cancers, lupus, or syphilis, we have an ulcerated surface usually, so there is very little trouble in differentiating between this and other conditions.

As to the treatment of the case before us. The general condition of the patient should receive attention. In the majority of cases you will find that you will have to build up the general condition of the patient with strychnine and iron, get the skin active, and occasionally relief will be quickly obtained without any surgery. Where cauterization becomes necessary I prefer chromic acid, as it seems to act better and more promptly in shrinking the blood-vessels. I would advise that you first try general or constitutional treatment, Turkish baths, etc.; get the skin active, so as to prevent the patient taking cold as much as possible. If relief does not follow, then I

would resort to local treatment. Remember in the nasal cavity we have three turbinal bones on each side, the superior, middle, and inferior, and the pathologic condition in this case is an engorgement of the tissues overlying these bones. Another symptom that I have forgotten to mention caused by nasal obstruction is a peculiarity in pronouncing certain words or letters, as the consonants M, N, and B, etc.; they are called dead notes. You will notice the pronunciation will be very defective when the nose is obstructed. What are we to do in such a case? Give the constitutional treatment mentioned, hydratics, massage, a cool sponge-bath every night, and if practicable every morning, rubbing well with a rough towel so as to bring about reaction. To shrink the engorged tissue spray the nose as I have indicated with cocaine. If chromic acid is used, take a saturated solution and reduce it about twenty-five per cent. Sometimes in these cases I think it is better to make a weak solution and apply it twice a week. If relaxation is not promptly effected by means of chromic acid, you may use the galvano-cautery; the latter, however, is painful and some patients will not submit to it. In the case before us we will take a small quantity of a solution of chromic acid on a probe wrapped with cotton and gently apply it over the whole inferior turbinal tissue of one side. In applying acids, as I have told you about other solutions, it is advisable to only dip half your cotton into the solution, allowing the balance of the cotton to take up the excess; in this way you are less liable to have running or dripping of the acid. The chromic acid that we are applying in this case is about forty per cent. strength. We find that the cocaine has shrunk the tissues very much, that there is now a free nasal opening, stenosis being almost completely relieved. The chromic acid has now been applied along the full length of the inferior turbinal bone. Remember that the turbinal bones do not go straight back, but down and back. You observe that it causes some reflex action about the eye, a profuse flow of tears from the lachrymal apparatus, which illustrates the fact that nasal stenosis might be a factor in the production of eye troubles; as a matter of fact it may cause conjunctivitis, keratitis, etc., purely from a neurotic or reflex action. It is well to recommend that patients cleanse the nose thoroughly two or three times a day with bicarbonate of sodium or chloride of sodium solution. Considerable sloughing sometimes occurs; we may have a muco-purulent discharge, occasionally some discharge

of blood, following the acid application, and it is better to always make this statement to your patient. Sometimes an intense facial neuralgia supervenes. Intense pain in the teeth is another feature which occasionally develops. I applied the galvano-cautery to a patient's nose at one time for the relief of obstruction, which was followed by intense toothache; the patient applied to a dentist, who extracted all the teeth upon one side before I again saw her. Of course, extracting the teeth had no effect upon the pain, its cause being in the nose. This is one of the dangers of applying the galvano-cautery about the nose; owing to its effect upon the nerves, it produces persistent pain in the teeth in some cases. In using the galvano-cautery you can employ either the street or the storage current for heating the knife. Commence your incision at the posterior end of the turbinal bone, press firmly, and make a straight incision forward. Sometimes it is advisable to make two or three such incisions. The first incision, if you make more than one, should be at the lower edge of the bone; if the upper incision were made first the vision would be obscured by hemorrhage from above. The result of this operation is that you have two or three lines of cicatricial tissue, which ties the blood-vessels down so they cannot dilate as they did before. The vessels may dilate between the incisions, but where cicatrization has taken place the blood-vessels will be so tied down that swelling and consequent obstruction will be very slight.

Nasal stenosis is one of the most common complications of so-called hay fever, ringing in the ears, and deafness. You may treat the ear from now until doomsday, but no relief will be obtained until you relieve the nasal obstruction. As a complication or concomitant symptom in many of these cases we find that there is an obstructed condition of the Eustachian tubes. The Eustachian tube may be engorged or relaxed, as it is in this case, causing a stuffy feeling in the middle ear, which may give rise to the ordinary catarrh of the ear. In relieving the nasal obstruction we also relieve, as stated above, the trouble about the Eustachian tube. It may be necessary in some of these cases, though, to use a Eustachian catheter, and you should have one of the proper size; if too small and the point sharp in introducing it, you may tear the mucous membrane and inflate the tissues of the neck, producing emphysema with strangulation. Get a catheter with a bulbous extremity; this little projection repre-

sents the point of the catheter, and you know by this where the tip of the catheter is after it is introduced. I often inject a small amount of cocaine solution, nitrate of silver solution, or iodine into the Eustachian tube through the catheter. In introducing the catheter I usually elevate the tip of the nose, hold the catheter vertical, passing the instrument in gently until it strikes the floor of the nose; as you slip the instrument along hug the floor of the nose closely and elevate the catheter until it reaches a horizontal position. Push the catheter back gently until it rests against the posterior wall of the pharynx on its lateral side, then withdraw it a fraction of an inch, turn it upward and outward, and it will enter the mouth of the Eustachian tube. I can feel the catheter override the little swelling at the mouth and drop into the entrance of the Eustachian tube; there can be no doubt that the instrument is now in the Eustachian tube; I press the air-bulb and the patient can feel the air passing into the ear. Some operators try to treat conditions of the middle ear without the use of the catheter, but I find in most cases the treatment is unsatisfactory unless the catheter is employed.

In this case I believe the trouble is purely an engorgement of the tissues, which makes the prognosis favorable. We will try chromic acid to-day, and if there is a relapse we will next use the galvano-cautery, as I have told you. Treatment by means of the galvano-cautery is more difficult and possibly attended with more danger of sepsis. Sometimes I use the cautery, then apply chromic acid along the incision made by the knife, thus getting the effect of both. I think by this method sepsis is less liable to follow. After the galvano-cautery is used usually a croupous membrane forms, which persists for several days. Sepsis from the nose is very common, so absolute cleanliness is necessary. After the cautery is used in the nose I have the patient keep the nose plugged anteriorly with cotton to keep the air out as much as possible.

CASE II.—This little girl, aged four years, you will notice is a mouth-breather; she has some enlargement of the tonsils, principally, I think, of the third tonsil, adenoid tissue in the naso-pharynx, about which you have often heard me speak. This adenoid tissue, or hypertrophied tissue, may be seen or felt hanging down in the naso-pharynx like a bunch of earth-worms. The diagnosis is made by means of the finger inserted in the mouth back of the palate, as in these little patients we are not able to make a diagnosis by

means of the mirror; we cannot get a posterior rhinoscopic examination. So we simply feel with the finger. I think the appearance of this child, the absence of nasal respiration and of much hypertrophy of the faucial tonsils, would indicate the nature of the trouble beyond any doubt. I am positive we have here a case of adenoids or hypertrophy of the third tonsil. The case looks a little as if it might be specific. The teeth and facial expression are suspicious. She has suppurative inflammation of the right middle ear. This is not only dangerous to the hearing, but is dangerous to life. I saw a statement in one of our medical journals not long ago that in England, Ireland, and Scotland there were fifteen hundred deaths in one year from suppurative inflammation of the middle ear. The danger is of brain abscess, purulent meningitis, and venous thrombosis. This form of ear trouble causes a large majority of brain abscesses.

The first indication in this case would be, of course, to remove the post-nasal obstruction, which is undoubtedly the primary cause of the ear trouble. By pressure upon the Eustachian tube it has shut off the middle ear entirely. There is a catarrh or hypersecretion of the middle ear until the ear is filled with mucus, but no pus unless it becomes infected from the post-nasal space or external auditory canal. The secretion, in the first place, is simply the hypersecretion of the normal mucous membrane lining the middle ear; by pressure we have pain, and by pressure on the drum-head we finally have rupture, then by infection externally this mucous discharge may become a muco-purulent discharge.

The diagnosis in the case before us is that there is some hypertrophy of the faucial tonsils, hypertrophy of the pharyngeal tonsil, and adenoid tissue in the vault of the pharynx; as a result of this she has pressure upon the Eustachian tube; inflammation is set up in the Eustachian tube involving the middle ear, going on first to a simple catarrh, then to a suppurative condition of the middle ear, and now she has a perforation of the drum-head.

The first indication for treatment is to relieve the original cause; clean out the adenoid tissue in the vault of the pharynx. That will give her free nasal breathing and relieve the obstruction in the Eustachian tube. If we could observe this child during the night we would probably find that she slept very lightly, lying flat on her back with her hands over her head, waking often during the night very much frightened, having bad dreams, fighting for air all night.

In the daytime she breathes through her mouth almost entirely. The air entering the lungs is not filtered, it is not rendered moist, it is not warmed, and cannot act properly on the carbonic acid gas in the blood; these children you will usually find very much stunted, with a peculiar facial expression, and you can often make the diagnosis as soon as you see them. They are dull, stupid, behind in their class at school, and in many cases the hearing is defective, just as in the case before us. We should first curette out the adenoid tissue or remove it with forceps; then keep the parts absolutely clean so as to prevent as much as possible the danger of sepsis, and also prevent any reformation of adenoid growths. As to the middle ear trouble, the ear should be thoroughly cleansed just as we would in suppuration anywhere else. Peroxide of hydrogen is one of the best cleansing agents we have. Some advise against its use in cases like this because it might force the pus out into the mastoid cells and produce trouble there. I think that danger is overestimated. I would advise the employment of peroxide of hydrogen in this case. This may be improved, I think, by the addition of a small quantity of dilute hydrochloric acid. Take one ounce of peroxide of hydrogen and add to it six or eight drops of the dilute hydrochloric acid; wash the ear with warm carbolized water; wipe the ear as clean as you can, then introduce the peroxide of hydrogen. If there is any involvement of the bone, the hydrochloric acid will be of marked benefit. This acid will assist you in shrinking any deposits of thickened tissue that may be present. Applications should be made three times a day. If there is much pus, you will find it acts very quickly; after three or four minutes wash out the ear with water and dry with cotton. If the discharge is very free, take bichloride gauze or some of the other gauzes cut in very narrow strips, roll it around a probe and introduce it into the ear, and in this way obtain free drainage. The gauze should be cut in narrow ribbons and left in such a manner that it may be easily removed, and not packed tightly. In the majority of cases where suppuration has not gone on for any length of time, where the bone is not diseased, such treatment will readily relieve the patient. If later on you find granulations exist, there will probably be an increase of pain and discharge with possibly necrosis of the bone. In such cases you will find that nothing will shrink the granulations so well as chromic acid. If there is much necrosis of the bone, I would advise putting the patient under the

influence of an anæsthetic, and with a curette scraping it out just as you would in any other part of the body. It is necessary to exercise care to avoid wounding the blood-vessels and nerves, especially the facial. Sometimes the auditory canal is so small that you cannot use the curette to advantage; then it is best to dissect the auricle and the cartilaginous portion of the canal posteriorly, lay them forward and curette; in this way the middle ear and mastoid cells can be easily reached; then the auricle and part of the canal can be replaced. A drainage-tube is liable to produce irritation of the canal, which should be avoided in all cases. Irritation of the auditory canal may result from acid or any other application unless you are careful to wipe it out thoroughly, leaving no excess, which might block up the ear and interfere greatly with drainage. In treating these cases it must be remembered that the ear needs no especial treatment. The treatment should be the same as we would apply to bone necrosis or suppuration elsewhere.

Conditions of this kind often follow scarlet fever and measles. A great many deaths from scarlet fever really should be recorded as deaths from ear troubles, and not from the scarlet fever *per se*. If the ear trouble supervenes and extends to the brain, producing brain-disease, death usually follows. Of course scarlet fever would be regarded as the primary cause, the ear trouble secondary, or frequently the ear trouble is never recognized.

From what has been said, you will recognize the importance of troubles of this nature, the importance of their prompt correction, and the dangers not only to hearing but to life. Two and one-half per cent. of the cases of suppuration of the middle ear are fatal. Realizing the importance of the subject, I hope such cases when they fall into your hands will be properly handled.

Dermatology.

ACNE.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY OF MARYLAND.

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GENTLEMEN,—The first case I bring before you to-day presents an oily, greasy appearance of the face. It is a condition which gives rise to no subjective symptoms, but is nevertheless a source of annoyance and mortification. A great number of persons suffer from it. If you will go into a factory where there is much smoke or dust floating in the atmosphere, some of the men will appear almost perfectly black, while others, subject to the same conditions, present very little soiling of the skin. The reason is that those with greasy skin retain the dust which falls upon it, while with those having a smooth, dry skin the dust does not adhere so closely. This greasiness and oiliness is due to an excessive secretion of the sebaceous glands. These glands give to the skin suppleness and pliancy, and prevent it from becoming dry too rapidly, cracking, etc. Normally, their functional activity is such as not to be noticeable, but when these glands become overactive, they pour out their secretion in disagreeable excess. The function of these glands is the secretion of sebum, as it is called, and the simplest forms of the modification of their function are diminution or excess of this secretion. Usually the modification is in the direction of excess. They are distributed everywhere except upon the palms of the hands, the soles of the feet, and, it is said, upon the glans penis; but they develop more highly in some parts than in others. Upon the hairy scalp they are very abundant, and still more so on the face. They are also abundant in the axilla and about the perineum. Every hair shaft has

a sebaceous gland. The hair gland often plays the most important part, and the small sebaceous gland opens into it away down in the shaft. About the face, shoulders, and axilla these glands grow to a very large size. Their function is, as I have said, the formation of sebum, or oily material. This oily material is formed by the fatty degeneration of the epithelial cells which line the gland sacs. It contains fat, principally oleine, palmatin, cholesterin, albuminous substances, salts of various kinds, and, usually, certain fatty acids. Where the hyperactivity of the gland results in the excessive formation of the oily matter, as we see upon the face of this young man, the disorder is called *seborrhœa oleosa*, meaning a flow of oily sebum; when the epithelial elements, which are always present in *seborrhœa*, sometimes in great quantities, form an unctuous, scaly deposit upon the skin, as in most forms of dandruff of the scalp, it is called a *seborrhœa sicca*. This disorder may often be seen in a mild degree upon the face of a smoothly shaven man; but when a man with a tendency to *seborrhœa sicca* lets his beard grow, he will often present a greasy, scaly deposit of the skin, which you can scrape off and rub up as a greasy mass under the fingers. It usually covers the skin of the hairy parts of his scalp, and sets up a certain amount of irritation, so that when removed a more or less congested surface is exposed. Upon extreme irritation this may become converted into an eczematous condition. The ordinary dandruff is due to *seborrhœa sicca*; but where this is very active, an eczematous process may be brought about which is known as *eczema seborrhoica*. *Seborrhœa*, then, is a result of functional hyperactivity, the glands being too free in their function. Usually it is one not associated with more than simple hyperæmia.

As we go a little further we find evidences of disorder in certain of these glands in addition to the *seborrhœic* condition. We get evidences of the imperfect emptying of some of them. The secretion collects and accumulates. We see here and there upon the faces of all persons little pores, the open mouths of the sebaceous glands. Under certain conditions these become stopped up, and we then see little black points. If you squeeze them, little worm-like accumulations are forced out between the fingers, the appearance of which has given the suggestion of worms, and so they are called flesh-worms. These "flesh-worms" are nothing more than the retained secretion of the gland,—retained sebum,—and the

black head is the hard head of the sebum, which has been discolored by the dust and smoke of the atmosphere. They are known as comedones. This sebum when properly examined under the microscope rarely shows a little organism, which looks something like an elongated itch-mite. It is called *Acarus folliculorum*. It has nothing to do with the morbid condition. This comedo, then, is a distended sebaceous gland, and experience tells us that when the glands tend to get into this condition they are more susceptible to inflammatory changes.

Up to this time I have spoken of no peculiar inflammation of the skin structure, but where we find these little "flesh-worms" accumulating to any extent, we are certain to find, in a greater or less degree, resulting inflammation of the sebaceous follicles. When this occurs, we have a condition known as acne. When this inflammation amounts to nothing more than a little redness of the skin, a formation of little red pimples or bumps surmounted with little accumulations of yellow pus, we speak of it as acne simplex. Now, this acne simplex marks a very important modification of the processes of simply disordered function of the glands. It marks the occurrence of purulent inflammation, a new element in the process. It shows that the enfeebled powers of resistance of these glands have admitted to them organisms which are exciting the formation of pus. If no external influence of this kind came to bear upon it, the gland would not suppurate. You might have any amount of seborrhœa or comedo, but if these influences from without were not brought to bear upon the glands we would not have suppuration. When one of the pus organisms (streptococcus or staphylococcus), which are floating in the atmosphere and which in countless millions are being deposited upon the surface, has been insinuated by friction into a glandular orifice, it may set up a suppurative process. When the organism finds admission, it involves the connective tissue of the framework of the gland in suppurative inflammation. There now appear subjective symptoms, and the face may burn and sting, but there is a notable absence of itching. If this inflammation is accompanied by much infiltration, as may often be the case; if the inflammation extends outside of the gland structure proper, there may be considerable enlargement,—little tubercles of inflammation, such as you can see in this patient. This is known as acne indurata; a higher degree of infiltration is known as acne hypertrophica.

Where there is a combination of seborrhœa, comedo, papules, pustules, and tubercles, the general term of *acne vulgaris* is used. There are a good many other terms employed, but I do not care to burden you with them. Where we have *acne indurata*, our patients often experience a great deal of discomfort, and such little points as we see here, which are red at the surface, may become converted into deep-seated points of suppuration, and pressure of the inflammation is sufficient to cause a great deal of pain. Here, for example, as I squeeze this one I express a considerable quantity of pus from deep down in the skin. These little abscesses exert a considerable pressure upon the connective tissue, and will by their suppurative process cause limited destruction of that tissue. When they get well they leave little scars, in some patients giving rise to pits like those of small-pox. This has been called *acne atrophica*. The eruption which I have described involves principally those parts of the skin where the glands are most abundant and largest,—the face, neck, shoulders over the scapula, and sometimes the breast. The disease very often tends to run a protracted course. The eruption usually begins about the time of puberty. Young men and women who are about reaching adolescence are very much annoyed with it. It usually prevails between the twelfth and thirty-fifth or fortieth years. In childhood it is very rarely seen, as also beyond the fortieth year. While the eruption is an annoyance and disfigurement, it has very little tendency to interfere with ordinary healthy life. I say to interfere with it, but I wish you to understand that it is usually the outcome of a more or less imperfect nutrition. Most patients will tell you that they suffer from dyspepsia or constipation; or, if of the female sex, acne may be associated with some menstrual trouble, amenorrhœa or dysmenorrhœa, or with uterine disease; occasionally there is no modification of the general health. Then again we have a number of drugs that will cause acne,—iodine, bromine, and tar, for example, but they are transitory, however, and disappear when the drug is stopped. It is very common for the sufferers to observe that after indulgence in very rich food, pastry, fried oysters, fried vegetables, thickened gravies, etc., they notice an increase in the activity of their symptoms. These are the principal causes of acne. Alcoholism is also a cause. Here, however, the tendency is to the production of a general hyperæmia of the small blood-vessels of the face in addition to the purely

glandular inflammation, and to cause that appearance which is so well known,—red nose, or rosacea,—in which there is often an enormous cutaneous hypertrophy of the face, and the nose and cheeks become misshapen from the new growth of connective tissue, which is due to constant hyperæmia of the parts. The cases which I present to you to-day do not present the disease in a very marked condition.

I shall now speak of the diagnosis of acne. It is quite unlike almost any other disease of the skin. It is quite characteristic, and there are very few conditions where it is necessary to institute a comparative diagnosis. In none of these cases, for example, would there be any difficulty in excluding eczema. The frequency of eczema as compared with acne is very much greater. Out of nearly one hundred and twenty-five thousand cases of skin diseases collated and tabulated by the American Dermatological Association, about thirty per cent. of all were eczematous. About seven per cent. of all were cases of acne.

From acne simplex the diagnosis of eczema is sometimes difficult, especially when it occurs upon the cheeks or forehead. In eczema the itching is pronounced, and the papules, vesicles, and pustules are seated upon a diffused infiltration of the skin. The eczematous eruption, moreover, from time to time tends to free discharge and the formation of crusts. The early syphilitic papular and pustular eruptions can readily be distinguished by their wider distribution and the concomitant symptoms. Tertiary localized syphilitic small tubercular eruptions may sometimes be mistaken for acne, but their course, coloration, circinate distribution, and history, and the results of treatment, made the differentiation easy. A widely diffused acne has been mistaken for variola.

It is quite possible for seborrhœa to assume appearances that are quite indistinguishable from eczema. Indeed, I told you that we may have with it a high degree of hyperæmia of the skin, which may very readily be changed into an active eczema. The redness of this young man's skin may become more intense, and he may develop a full-blown eczema. For the treatment of acne you will be constantly consulted, and often baffled. At the same time, in a great majority of the cases, you may expect, under judicious treatment, to obtain most gratifying results. First of all, with regard to what is called constitutional treatment. It is very much out of

the fashion to introduce constitutional treatment in acne, but I am convinced that it will do a great deal towards preventing the recurrence of this hyperæmia of the sebaceous glands. By correcting this influence we may succeed in treating successfully our acne without any external remedies. Gastric disturbances should be corrected. Constipation, menstrual and uterine disorders, and perverted sexual functions should also be corrected. How are we to proceed with the gastric and intestinal disorders, which are so frequently the promoters of this trouble? Lay down certain general rules which are to be adhered to very closely. In the first place, caution your patients to observe great abstemiousness in diet. Every one eats more than he needs. The great trouble is that not only does he eat more than he needs, but often more than he can digest. Let us start out, then, with the advice to our patient to eat less than he would like to; in other words, to leave the table before his appetite is satiated. Then go into detail and give him instructions about his diet. You can lay down these general rules with a great deal of confidence. Let him eschew hot bread. The objection to hot bread is not because it is hot, but because of its freshness. This can easily be shown by taking a fresh and a stale loaf. If you tear out a portion of the freshly baked loaf and squeeze it in your hands, it is converted in a moment into dough. If, however, you will take a portion of a stale loaf, you will find that it crumbles. The hot bread when taken into the mouth passes into the stomach and remains there an imperfectly digested mass. The stale bread is acted upon very readily by the saliva. Stale bread is readily permeated and prepared by the saliva for the conversion of its starch into diastase, and so digestion goes on unimpeded. Let your patient eat nothing that is fried. Thorough frying by an artist in his profession is just as unobjectionable as any other form of good cookery; but cookery is an art not in general practice to a very high degree, and you will find that most articles that are fried are so saturated with grease that when they enter the stomach they are as if hermetically sealed and the gastric juice reaches them very imperfectly; as a consequence, acid fermentation develops. Let him use no fried beef-steak, veal cutlets, or fried vegetables. Then let him eat no made gravy. By this I mean that which is thickened and served up separately. Then, again, he should avoid all richly cooked dishes and pastry. If you can persuade him to eschew these articles, you will

be a long way on the road to putting his sebaceous glands in a healthy condition. The difficulty lies in persuading him to do it.

What may he eat and drink? He may eat any kind of broiled, roasted, and boiled meats, together with plain cooked and boiled vegetables, any kind of fresh fruit, and good stale bread, so that by denying him improperly cooked food you by no means inhibit the ordinary pleasures of the table. So much for the stomach digestion. Where constipation is present you will find many excellent remedies. The ordinary Lady Webster dinner-pill is very efficacious. One taken daily at bed-time cures unless the constipation is very pronounced. I think the best purgative is a saline. Now, we may use one of the bitter waters, sulphate of soda, rochelle salt, etc., or you may make your own prescription. For example,—

R Magnes. sulphat., $\mathfrak{z}\text{i}$;
 Acid. aromat. sulphuric, $\mathfrak{f}\mathfrak{z}\text{i}$;
 Syrup aurant. cort., $\mathfrak{f}\mathfrak{z}\text{i}$;
 Aq., q. s. ut ft., $\mathfrak{f}\mathfrak{z}\text{iv}$.

Sig.—Take a tablespoonful in a small amount of water before breakfast.

The result is a free and watery action. If the patient suffers from anæmia, you may add small doses of iron sulphate to each dose. There is no specific remedy for acne. Some have thought they secured prompt recovery under the administration of calx sulphurata in doses of one-tenth to one-sixth grain every third or fourth hour.

I shall not go into the details of uterine or menstrual disorders. If present they should be appropriately treated. Having provided in this way for the general health of the individual, what can you do locally? A great deal. The best remedy for acne is unquestionably sulphur, which may be added to benzoinated lard, one, two, or three drachms to the ounce, and well rubbed into the face at night. If the ointment is objected to, we may try sulphur as a wash. The sulphur lotum may be added to plain water or water and alcohol and applied freely as a local application. This I would recommend for ordinary acne. If our acne resists this treatment, we may make use of other agents. I still prefer the sulphur preparation, and you may remember one that I advised the other day containing sulphate of zinc, potassa sulphurata, alcohol, and water. You may make the preparation a little more elegant by adding bay rum,—one-half drachm zinc sulphate, one-half drachm potassa sulphurata,

one ounce of bay rum, and three ounces of water. If you put in plain alcohol instead of bay rum, you can add rose-water. Both the zinc and potash are soluble in water, but they should be dissolved separately in equal parts of the menstruum and then mixed. The result is a precipitate with a slight sulphuretted odor. The strength of the ingredients may be increased as occasion requires.

This mixture should be freshly prepared, at least, every ten days, as it undergoes decomposition and becomes valueless.

The combinations of sulphur used in the treatment of acne are innumerable, and you will find many valuable formulæ in your text-books. Solutions of corrosive sublimate are very useful. If made stronger than a half-grain to the ounce of solvent they are apt to prove too irritating. It often happens that a remedy that at the beginning answers admirably will lose its influence and must be substituted by another. Ointments of resorcin (twenty per cent.), chrysarobin (ten per cent. to twenty per cent.; objectionable because staining the skin), calomel (one drachm to one ounce), white precipitate, and carbolic acid may be employed. Acne indurata often yields promptly to green soap (*Sapo viridis*, U.S.P.). This should be used at night after bathing the parts with hot water. It may be rubbed into the skin with hot water and a rag; a free lather should be induced; or it may be used in the form of the *spiritus saponis alkalinus*, rubbed in in the same manner. If the burning and stinging resulting from this treatment prove excessive, after the skin has been rinsed and dried rose water ointment, or an ointment of zinc oxide or other soothing substance, may be applied; otherwise, a mild sulphur ointment may follow the use of the soap. Excellent results may be had from the method of Fox,—that of curetting the lesions, after which an emollient ointment may be applied.

I have said nothing to you of the treatment of comedones. We can prevent their occurrence by hygienic management sometimes; but after comedo is formed you cannot do anything with it in the way of ordinary treatment. The only way is to squeeze it out. When you desire to treat and get rid of these comedones, direct your patient to wash his face very thoroughly with green soap and water. This is then to be washed off with hot water, and after being dried take a watch-key and press firmly and gently upon the little plug-worm, and it will pop out. This should be done at night, as the

pressure leaves a little ring of hyperæmia, which, however, passes away after an hour or two. These comedones should be removed always, as they eventually, if undisturbed, are apt to be the starting-points of acne pustules.

Seborrhœa may be treated hygienically and by the use of green soap. This is a very troublesome feature, however, because it is usually dependent upon congenital overactivity of the sebaceous glands. Many children as they grow to adult life show it, and it may continue until old age. It is an inherent tendency, and often we cannot correct it. Where it is not so pronounced, however, we can control it. When the oily condition of the skin is not pronounced, it may be corrected by a combination of general and local remedies. Internally, iron, arsenic, and cinchona bark improve the tone of the skin and its appendages. Gastric intestinal or uterine disorders should receive due attention. Locally, mild stimulating or astringent applications are frequently sufficient in mild cases; solutions of boracic acid (five to ten grains to one ounce), zinc sulphate (one grain to one ounce). Many ladies rectify a slight tendency towards seborrhœa oleosa by harmless dusting powders. In pronounced cases no application is more useful than the green soap, as just described. Seborrhœa, however, and especially the dry form, merits more attention than we can give it at present. Before closing, let me give you one caution. Persons who have been using an application containing sulphur should be cautioned against employing substances containing lead, mercury, or other metals immediately afterwards. The black sulphide of the metal that will be formed will cause a hideous discoloration of the face, and every gland orifice will give the effect of a comedo. This deformity, however, will only prove transitory, but during its persistence may be the cause of a good many "bad quarter-hours" to the unlucky physician who occasioned it.

CONTAGIOUS IMPETIGO.

CLINICAL LECTURE DELIVERED AT THE POLYCLINIC HOSPITAL, PHILADELPHIA.

BY J. ABBOTT CANTRELL, M.D.,

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GENTLEMEN,—Owing to what I feel is an increased prevalence of certain contagious diseases of the skin, I have chosen one of those which happens for the most part in infants and young children for the subject of my remarks this morning, and yet at the same time I will make mention of contagious impetigo as it affects those of more mature years; in fact, those in whom we are confronted with a beard, and in whom mistakes of diagnosis may be caused on account of the frequency of certain cutaneous outbreaks in this region. It is rare for one to have the opportunity to witness or study this condition in the earlier stages owing to the non-attention of the affected person or the parents giving it only a passing glance, and thus allowing it to progress for an indefinite period until certain other symptoms are produced, which are nevertheless just as pathognomonic of the affection.

The disease is observed, in the greater majority of the cases presented, in the region of the mouth, around the angles or over the chin, at or near the nasal wings, immediately below the eyes, and upon the centre of the forehead. Another list of cases may show lesions occupying a much greater amount of surface, and, in fact, as often observed in children, the condition may be found to occupy the face as well as both the lower and upper extremities and around the buttocks. In men it will be seen scattered at different portions of the bearded region, especially the sides of the face and upon the skin of the submaxillary region. As it may often resemble forms of ringworm when it attacks this latter region, the correct diagnosis

should be made. These points of differentiation will be referred to when the cases are presented.

The first lesion that appears in cases of contagious impetigo is a small vesicle, which is hard to the touch and contains some serum and presents little, if any, inflammation around its border. After a time this increases in size and shortly ruptures, throwing off this serum, which collects upon the surface as a peculiar gummy crust. This crust, which is of a grayish-yellow color, has peculiarities which are not observed in other affections of the skin,—i.e., that it appears as if stuck onto the part, as would be noticed shortly after mortar had dried upon a wall upon which it had been thrown. The edges of the crust in this affection are detached, and it is easy to pass the edge of a sheet of writing-paper beneath it. This peculiarity is not observed in other crusts, all of which are attached firmly at their borders.

In presenting the first case to your view I wish to particularly draw your attention to the earlier lesions, which are shown in several portions of the affected areas.

This boy of seven years gives the history of having the present eruption for the past two weeks, stating that he believes that the condition was contracted in one of the city baths, which are infested with rather a low element of society (Fig. 1). Upon the left side of the mouth you may notice several crusted lesions in which little if any inflammation or redness is found. These crusts present the characters spoken of above, in being detached at their borders and firmly adherent in about their centre. Upon removing one of these crusts you may notice a smooth, shining, and moist surface and one which shows very little inflammation, in fact, it presents rather a whitened aspect. It is discharging a serous fluid. I wish all to look carefully at these lesions, which are scattered over the right side of the face about the centre of the cheek. We see here several small vesicles, which to the touch appear rather hard or shot-like, and which look as if the contents were of a thin consistency, and to a slight degree resembling the appearance that water would give encased in these thin walls. You notice that the lesions are rather less inflammatory than would be supposed to attend vesicular out-breaks, and that as here presented they have a tendency to early rupture with subsequent and quick formation of crusts. These lesions



FIG. 1.—Confluent form of contagious impetigo.



are rarely seen at this clinic, because cases do not appear until the lesions have ruptured and become crusted.

This second child shows lesions which have precisely similar characters but in greater profusion, and consequently much more may be learned through close attention to every detail. While in the case previously shown few lesions were present, you may see here depicted about ten or twelve well-formed crusts, which show the extremely light hold these crusts have upon the surface of the skin. Before removing the crusts I wish all to observe carefully this peculiar attachment, and now that I raise the dried discharge it will be seen that the surface is only slightly reddened and moist with a sticky substance of thin consistency. Upon passing a piece of cotton over this area and removing all of this material you see only a glistening reddish surface, and are thus confronted with no form of ulceration or depression of the part, it being completely on a level with the surrounding healthy skin. The appearance of this underlying skin after removal of the crust is just as pathognomonic as the first lesion or the subsequent crust. Now, while these cases remain before us, allow me to show the differential diagnosis between this affection and some of the other cutaneous affections which may resemble it. (See Fig. 1.)

First of all impetigo shows a marked tendency to contagiousness, and while pustular eczema may often resemble it, this fact is never contributed. The latter affection presents lesions in greater profusion, with itching as a marked symptom. In eczema the discharge is more abundant, while the lesions present a tendency to coalescence and the formation of more bulky crusts. Contagious impetigo is a disease of a few days' duration, while eczema may be of as many weeks or longer. There is no infiltration in this disease before us, while eczema is usually infiltrated to a marked degree.

Zoster and simple herpes present inflammatory areas surrounding the lesions, while the lesions show a tendency to group, and never rupture without assistance. There is no crusting in herpes without a reason can be advanced for it. The lesions do not present a hard base. Herpes zoster usually is painful, while impetigo does not show the element of pain.

The next cases that I show you are somewhat dissimilar, in the fact that the scabs are rather scattered irregularly over a large area and present lesions somewhat differing in size and characteristics,

and consequently offer greater inducement to mistakes in diagnosis. This child of two years, which accompanied its mother, presented for treatment yesterday. The notes in the case-book show that the condition has existed for two months, and that other than home remedies no treatment has been instituted. The lesions are observed on the face, around the mouth and nose, upon the forehead, upon the arms and legs, and surrounding the buttocks and gluteal region. The face lesions do not differ at all from those observed in the cases just before us, but those upon other portions are somewhat more aggressive. The lesions upon portions other than the face have increased to a size larger than those present upon that portion, and instead of remaining as small vesicles have reached a size usually observed in other bullous eruptions. These lesions have ruptured and formed into larger crusts, although showing the same characteristics with the addition of presenting points of increased pigmentation, which are the marks of previous attacks. Here where a crust has been rubbed off is seen the glistening moist surface, without any ulceration or depression, as observed in the cases previously shown. According to the statement of the mother, the spots had all healed several times when there would be a fresh outbreak, thus showing that the condition had spread by contamination, possibly through the finger-nails, under which I find an accumulation of matter.

The next case occurs in a child of one year of age, in whom the condition has lasted two weeks and in whom the disease has spread over the greater portion of the body, as observed in the case just before us. The lesions have not reached the same magnitude as in the other case, but occupy a much greater surface. In addition to affecting the face in all its parts the lesions are observed upon the arms and legs, hands and feet, around the buttocks and gluteal region, and upon the anterior and posterior portions of the trunk. All of the same characteristics are visible, and from the statements of the mother we have a direct history of contagion from some of the neighboring children. No other member of the child's family has the complaint, but this fact would not remain long if this condition is not soon removed. Itching is present in this case, but was not a marked symptom in the other cases. This child has had no treatment, consequently the reason is apparent why the condition has spread so considerably.

From varicella we can easily differentiate this affection, because



FIG. 2.—Contagious impetigo of the beard region.

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chicken-pox presents lesions of small size, while fever is a marked feature, and the child has symptoms of malaise. The lesions of varicella present a circle of redness without a strong tendency to rupture and crusting. The lesions are often umbilicated. They often become pustular, and are only of a few days' duration.

Scabies can easily be diagnosticated if the characteristic burrow is looked for and the *acarus* found. Pemphigus shows periods of evolution, while the seat and character of the lesions suffice to establish the differentiation.

When contagious impetigo occurs in the adult errors of diagnosis can easily be made, on account of the supposition that the disease is rare in this age, and because of the fact that it often resembles *tinea circinata* or superficial ringworm of the body surface. In presenting this man to you I hope to show you distinctly that contagious impetigo does occur in the bearded region, and more often than is usually supposed. He comes with a history that the affection began three days ago, and that he noticed a small pimple (vesicle) on the right side of his chin, which increased rather rapidly in size, and rupturing soon showed the crust that is now present (Fig. 2). In addition to the one lesion mentioned I now find several similar ones scattered over the bearded portions of his face, one upon the right side of the mouth at its angle, another upon the left cheek, and still one more upon the left submaxillary region. These are all crusted, but I find one upon the right submaxillary region that is not crusted, and which has accepted a circular outline, and thus resembles the superficial ringworm.

At the same time I wish to show this young man, who presents several lesions upon the bearded portion which are of a few days' duration. You notice that no crusts are as yet present in this condition, but that the lesions have ruptured, and probably their discharge has been removed by the labor adopted by the man himself, and he has thus prevented the formation of the characteristic collection of material. You notice how closely these lesions resemble *tinea circinata*, and yet I will show you that they are not this form of ringworm. This young man is in the habit of shaving himself, while the other one went frequently to his barber. One fact may be mentioned, and that is while this young man did his own shaving he sent his razor regularly to a barber to have it sharpened, and probably this is the cause of his contracting the affection.

From *tinea circinata* we differentiate this condition by remembering that in the latter condition the disease begins as a small papule instead of a vesicle, and as it spreads it increases upon its periphery and soon shows a ring or circinate lesion. There is no rupturing, and consequently no crusting. While *tinea circinata* is also a superficial eruption, it soon tends to attack the hair and its follicle, and then the lesions present a much greater difference and one in which there are no likelihoods of error. *Tinea circinata* usually presents one lesion, while contagious impetigo is never confined to one point of attack. Contagious impetigo does not increase upon its periphery, while ringworm does. Contagious impetigo does not present lesions of similar character around the affected patch, but often in the history of a circinate ringworm we may notice the appearance of vesicles or pustules. Circinate ringworm tends to heal in its centre, while this is not noticeable in contagious impetigo.

We are not aware of a specific fungus in contagious impetigo at the present day, but from the efforts being made in that direction by bacteriologists there is no doubt but that we will soon be in a position to positively name the character of the parasite that causes the condition. Numerous bacteria have been found by the several different observers, but no constant germ has as yet been demonstrated. That the disease is contagious admits of no doubt, as numerous inoculations from person to person will corroborate.

The treatment of this affection is no less important than is the diagnosis, for the very fact that the disease is autoinoculable, a fact which is corroborated every day by the extension of the disease in persons so affected, and as the affection is observed at diverse portions of the body, there must certainly be a carrier (Fig. 3). Generally the carrier of this affection from one portion of the body to another is the hands, and especially the finger-nails, under which the fungi may become numerous, and they are thus brought from one point of attack to other regions, which in their turn present similar lesions. From person to person this contagion may occur, as is frequently the case in the beginning. Children living in close proximity to one another or who are allowed to occupy the same bed soon contract the disease and show the same characteristics as in their playfellow.

There are a number of drugs which may have a controlling in-



FIG. 3.—Annular and serpiginous type of contagious impetigo. (After Schamberg.)
(Reproduced by permission of the Journal of Cutaneous and Genito-Urinary Diseases.)

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fluence upon this disease, but they must all have the elements of germ-destruction or else their result will amount to *nil*. From these, the best advantage may be received from the ordinary ammoniated mercury or one of the so-called antiseptics that are so numerous at the present day. The first measures to be adopted must be the removal of the crusts, and these may be expunged by means of a simple dressing of sweet oil or a poultice of starch as used in the starching of clothes. After these crusts are thoroughly soaked they can be easily picked off by the serrated forceps, and then we can apply our curative measures. Ammoniated mercury in the strength of fifteen grains to the ounce will generally suffice to remove this condition in a few days. Other remedies, such as resorcin, salol, or salicylic acid, in the strength of from ten to twenty grains to the ounce, of petrolatum or lanolin, will often give good results. It will not be necessary for me to include any others, for the very reason that failures need not result from the judicious applications of one of those mentioned above.

At times it may be found necessary to give these affected persons some form of internal medication, and often we may find that the judicious administration of iron or cod-liver oil or some other restorative agent may be advisable in those who may not be in the best of general health. I am a firm believer in the fact that this condition would not arise in those of robust constitutions, but only affects those who are not in the best of health at the time of attack, and for this reason I believe it necessary to always give internal tonics of one form or another.

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